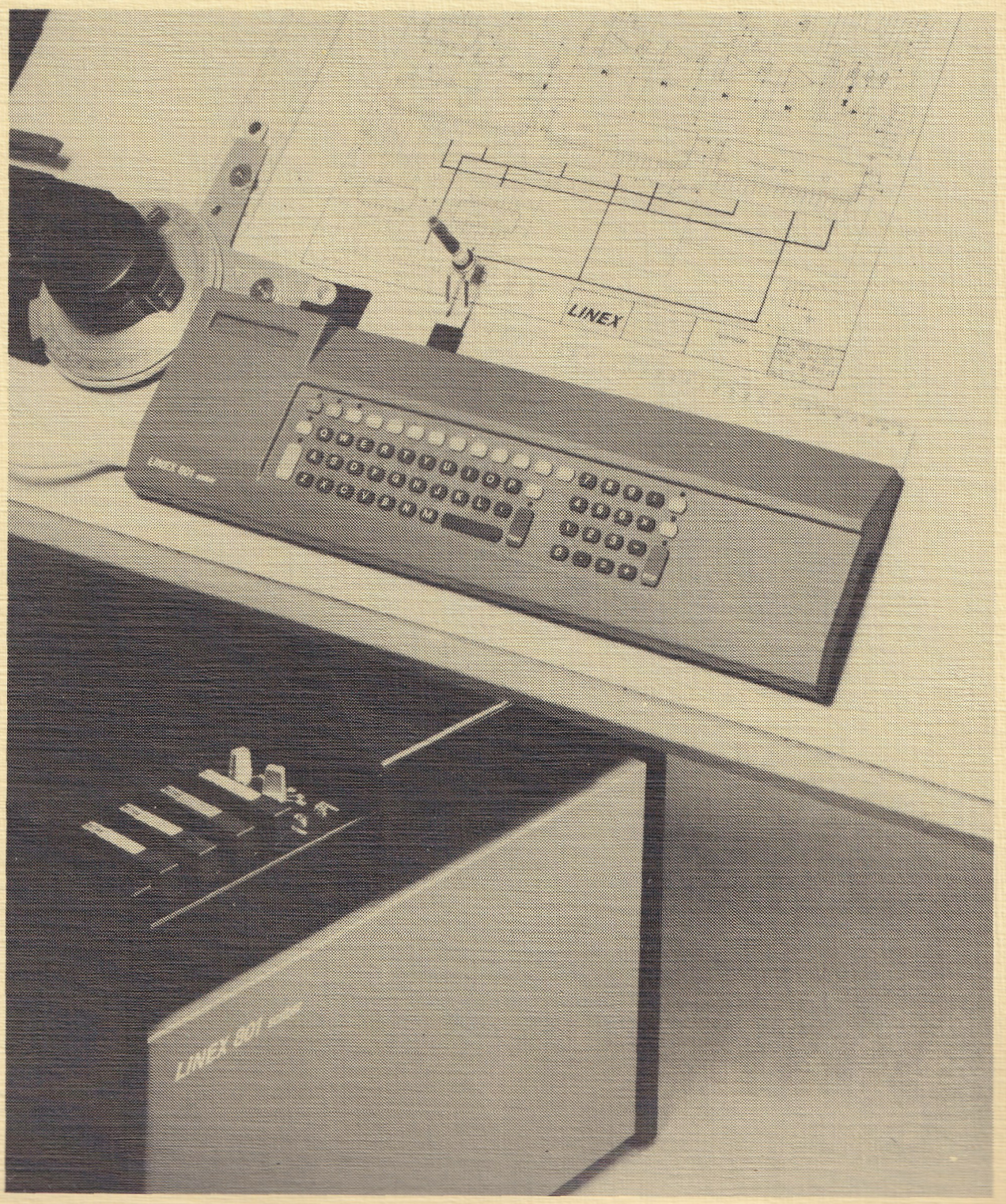
LINEX scriber 803

REFERENCE MANUAL

EDITION SEPT. 1985



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1. Introduction

The Linex 803 scriber is a computer controlled lettering and drawing device.

Characters, figures, and symbols are drawn with the touch of a button. The scriber frees the operator from tedious routine, yet lettering and drawing are of utmost precision.

Most standard technical pens can be used.

The scriber consists of two parts . The controller rests on the floor next to the drawing table. **The scriber** is connected via a cable to the controller and is placed directly on the drawing. The controller contains all the software needed to operate the system:

— Special characters/symbols shown on the scriber keyboard
— Special functions (dimensioning, tolerancing, changing lettering heights/slopes, etc.).
— Working storage memory.

The system can be enhanced through the use of special cassettes. Note that the controller has connectors for up to four (4) cassettes, howewer, the system requires a fontcassette to be inserted in connector 1.

Using cassettes additional symbols/figures can be drawn, more memory can be added, or the internal font can be overwritten with a different font.

This manual explains all the functions of the scriber. Refer to the table of contents for a quick reference as to where to find a particular function.

1.1 Concept

Operating the scriber is intentionally simplified, allowing correct use after a very brief introduction.

Consequently all functions are printed on the keys, and all sequences of keystrokes follow the same pattern, as known from typewriters, telephones and calculators throughout decades.

Additionally the display will show messages, which together with lamps will indicate the current mode of operation.

Using the functions is principally done by - calling in - then using - and finally calling off. Just like switching on - listening - and switching off a radio.

2. Installation

2.1 Unpacking and mounting

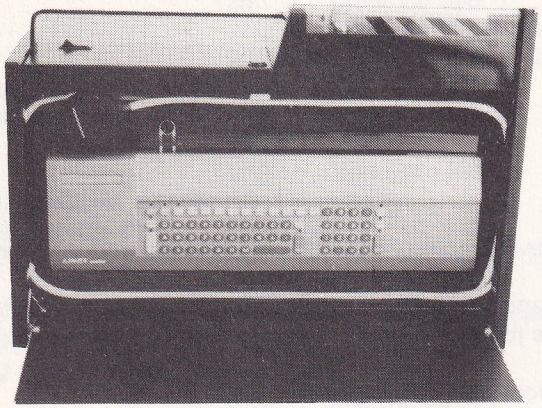


Fig. 1

The scriber deposit in the control unit is opened by depressing the button located under the carrying handle.
You can choose to detach the scriber from a standing or a lying control unit, the door can swing open 180 degrees.
Unwind the cable first, then fetch the scriber in the cushion cut-out, and lift out gently.

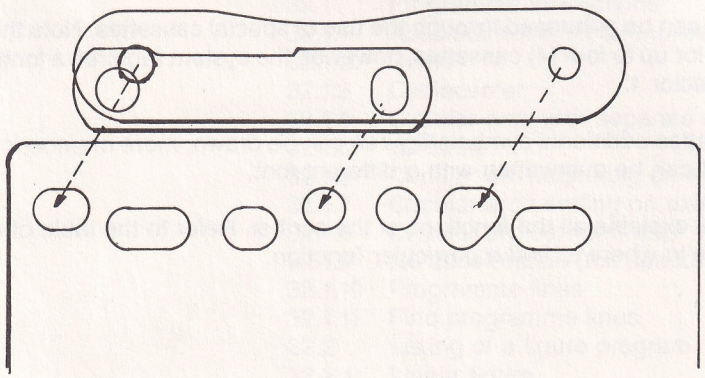
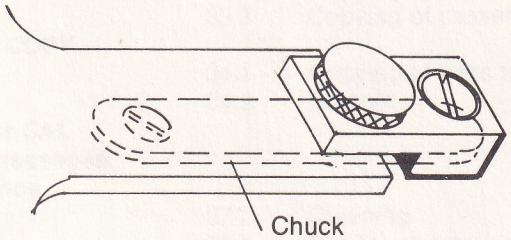


Fig. 2

Mounting of scriber

The scriber is fitted as a ruler to any drafting machine, by using a regular ruler chuck, fitted on the protruding mounting plate, above the display window.
The mounting plate contains a pattern of holes to fit any type of chuck. In the groove below, several patterns of threaded inserts can be placed, according to the various screw thread diameters and center distances.
Choose the chuck position bringing the scriber as close as possible to the drafting head, and give room for securing clamps fitted on the ruler attachment.
Instead of using rare chuck screws, ordinary MS countersunk × 5,5 mm length and M5 × 8 mm pan-head screws can be used.



Part no. 26050

Fig. 3

Important

Always secure the scriber against sliding out of the chuck adapter, tightening the drafting ruler clamp-screw.
If no such screw is provided, use **LINEX scriber securing bracket** fitted on the right chuck-screw, and tighten the knurled-head screw into the ruler attachment.

2.2 Mains selection

The control unit can be connected to mains supply of 110 or 220 Volts ± 10 % in the frequency range 48-66 Hz.

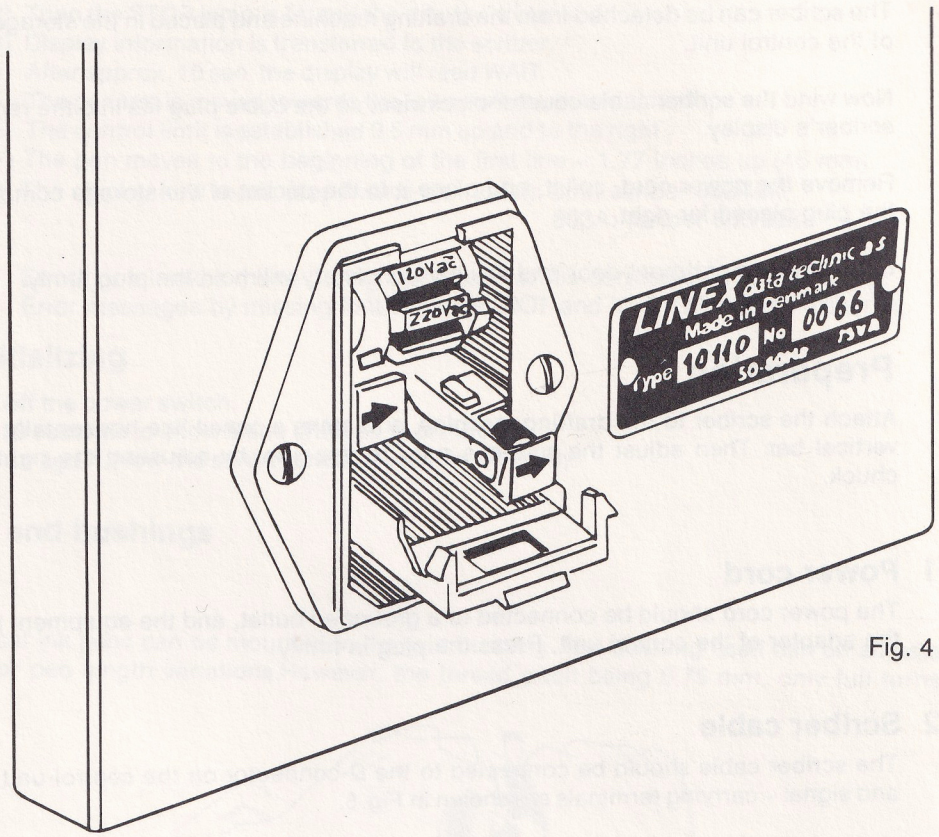


Fig. 4

Voltage selection can be made by opening the selector (see Fig. 1) **removing** and turning the indicator before replacement. The indicator has coded notches that by themselves switch to proper voltage, when the panel is closed. The selected voltage is shown above the power cord receptacle.

Mains fuses are located under the voltage selector. Fuses are T 250 mA at 220 Volts selection, or T 500 mA at 110 Volts.

Grounding (earthing) is of prime importance for scriber 803, in order to make safe interface to external computer or printer.

Absence of grounding is a violation of warranty.

Linex data-technic a/s assumes no responsibility for damage to connected equipment.

2.3 Detaching and storage

The penarm of the scriber can be placed in the parking position by first switching off the scriber - wait for 5 seconds - and switch on again.

The pen will move to the lower left hand corner of drafting area. Now switch off finally and remove the pen.

The scriber can be detached from the drafting machine and placed in the storage compartment of the control unit.

Now wind the scriber cable counter-clockwise, so the cable plug fits into the recess above the scriber's display.

Remove the power cord, coil it, and place it in the pocket of the storage compartment door - the plug placed far right.

Close the compartment door and flexible upholstery will hold the plug firmly.

3. Preparation

Attach the scriber to the drafting machine, and make a pencil line horizontally, by moving the vertical bar. Then adjust the scriber's ruler to this line, by adjusting the right screw on the chuck.

3.1 Power cord

The power cord should be connected to a grounded outlet, and the equipment plug placed in the adapter of the control unit. Press the plug in firmly.

3.2 Scriber cable

The scriber cable should be connected to the D-connector on the control unit. The current – and signal – carrying terminals are shown in Fig. 5.

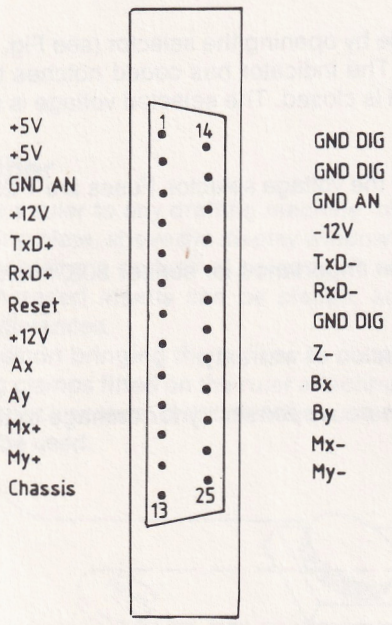


Fig. 5

The cable should be clamped to the vertical drafting machine bar by the three self-adhesive clamps provided.
Find a proper location for the lowest clamp first, by descending and elevating the scriber. Allow enough cable to avoid any sharp bends. Then place the second clamp high on the vertical bar, and the third clamp on the rear side of the horizontal carriage.
The control unit can then be conveniently stowed away under the drafting table and the cable can move freely at the rear.

3.3 Initializing

Important: The scriber requires a standard font inserted in connector 1.

Power is applied by means of the power switch located beneath the carrying handle. When power is on, the control panel lamp "POWER" is lit, and initialization of the computer begins through the following sequences:

1) When power supply is stabilized, the lamp "COMPUTER" is lit.
2) Then the STOP lamp is lit, and the display is blanked.
3) Display information is transferred to the scriber.
4) After approx. 10 sec. the display will read WAIT.
5) The penarm is moved towards the lower left mechanical limit.
6) The control limit is established 0,5 mm up and to the right.
7) The pen moves to the beginning of the first line – 1.77 inches up (45 mm).
8) The display now reads (depending on model): 803: scriber 803/16k
   803A: scriber 803/32k

Errors or mistakes made during operation can be corrected by re-initializing.
Error messages by missing font-cassette: ROT and VECTOR Lamps flickering.

3.4 Re-initializing

Switch off the power switch.
Wait 5-10 seconds to allow static charges to disappear.
Switch on again. Now the scriber should function normally.

3.5 Pens and bushings

Pens

Technical ink pens can be mounted in the pen bushing. The bushing itself can be adjusted to allow for pen length variations.However, the thread pitch being 0,75 mm. only full turns are useful.

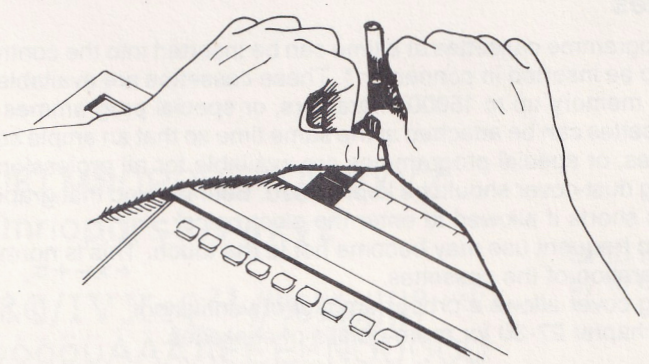


Fig. 6

Always grip the penarm firmly by one hand, when inserting or unscrewing pens, or when making height adjustments, to avoid damage of the penarm mechanism.
Pens should be screwed in tightly to assure controlled guidance.
Pens are pre-loaded 7-10 grams against the drafting paper, hereby allowing use on elevated tables. The use of long pens, their center of gravity being very high, offsets the pre-loading, and leads to unstable writing. If such pens are unavoidable, reduce the penspeed to compensate.

Exchangeable bushings are available for most technical ink pens:

Keuffel+Esser, Koh-i-Noor, Reform, Rotring, Pentel, Staedtler:	Nr. 22410
Faber-Castell:	Nr. 22400
Graphoplex:	Nr. 22420
Hewlett Packard Plotter pens	Nr. 22430

Ball-point pens require a larger writing force and can not be used.

Pencils are unpractical for scriber use.

Fiberpoints make lines of varying width and are not recommended, although adaptors are available.

3.6 Rulers, exchange of rulers

The scriber ruler contains two scales; one 300 mm length for hand use and another, indicating pen position, 0-25 cm.
A triangular indication at 25 mm points to the circle or figure center.
The ruler can easily be exchanged in the following manner:

1) Remove the pen.
2) Pull out the left end of the ruler approx. 5 mm.
3) Pull out the right end of the ruler approx. 5 mm.
4) Now pull the ruler straight out.

The ruler is secured in both ends by means of spring loaded balls. Insert the ruler in the opposite order. Assure that the two-supporting lugs on the ruler are seated correctly.

Scales

The scriber ruler can be exchanged to various scales similar to drafting machine scales.
Consult your scriber dealer for scales available.

Scales	No.
1:1 mm	40100
1:2 mm	40101
1:2,5 mm	40102
1:5 mm	40103
1:1 1/16 inch	40130
1:1 1/10 inch	40131

3.7 Cassettes

Up to 4 programme cassettes at a time can be inserted into the control unit. 803 requires a font-cassette to be inserted in connector 1. These cassettes are available with other fonts, symbols, expanded memory up to 15000 characters, or special programmes specified by the user.
The 4 cassettes can be attached at the same time so that an ample selection of other fonts, symbols, figures, or special programmes are available for all professions.
The sliding dust-cover should be kept closed. Bear in mind that graphite dust is conductive and can cause shorts if allowed to enter the electronics.
Casettes in frequent use may become hot to the touch. This is normal, and does not affect the proper operation of the cassettes.
The sliding cover allows a proper amount of ventilation.
See also chapter 27-30 for more details of cassettes.

Warning

Cassettes must only be inserted or extracted from a switched off control unit.

Static electricity from synthetic material, clothing, carpets or plastic office equipment may discharge through the cassette connector that leads directly to the microprocessor. The microprocessor then is made conductive, causing the computer to be overloaded, and severe damage may occur.
The delicate microprocessor circuit is protected by special circuits, however, static charges may fool these and thus be misread as energy-switching signals.

Remember: Warranty is void, if the equipment is used incorrectly.

4. Built-in facilities for technical lettering and drawing

The scriber contains one lettering style and the necessary supplementary characters for common use, by inserting a font-cassette into connector 1.

4.1 Technical lettering

Universal ANSI Y 14.2

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789 .=+-×÷
$¢?!¡¿:;αβμΩ&@/IVX±Ç²³·//%‰()[]°′″‴
áàâäéèêëñóòôöüÁÀÂÄÉÈÊËÑÓÒÔÖÜ

GRID module 8.94 mm (.352″) by 10 mm lettering height.

ISO 3098 B:

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789 .=+-×÷
$¢?!¡¿:;αβμΩ&@/IVX±Ç²³·//%‰()[]°′″‴
áàâäéèêëñóòôöüÁÀÂÄÉÈÊËÑÓÒÔÖÜ

GRID module 7.94 mm (.312″) by 10 mm lettering height.

DIN 17

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789 .=+-×÷
$¢?!¡¿:;αβμΩ&@/IVX±Ç²³·//%‰()[]°′″‴
áàâäéèêëñóòôöüÁÀÂÄÉÈÊËÑÓÒÔÖÜ

GRID module 7.94 mm (.312″) by 10 mm lettering height.

For writing use a tubular pen diameter 0,1 × lettering height.

The following heights are standardized:
1.8 - 2.5 - 3.5 - 5 - 7 - 10 - 14 - 20 - 28 mm, the scriber however, can make all intermediate sizes, which should not be used for technical drawing.

The $\sqrt{2}$ between sizes, follows the A-paper-sizes and allows continued lettering on reduced drawings making pens and linewriters to fit.

4.2 Internal registers STO RCL

The scriber can store 10 lines of characters, each 32 characters long.

The storage registers are accessed via the numeric pad, as numbers 0, 1 to 9.

To store a text, go to STOP-mode and write using the display, and finally store by pressing (STO) and registernumber.

A full line makes a beep-sound.

The text can be recalled by pressing (RCL) and the registernumber.

The text can be written by pressing (PRINT)

The full display content can be seen by pressing the DISP-key.

The storage register content disappears with Power Off.

Example:

(storage) (STOP) (Key in) Motor (STO) (5)

(Recall) (STOP) (RCL) (5) (displays) Motor

(writing) (PRINT) (written) Motor

4.3 Internal memory

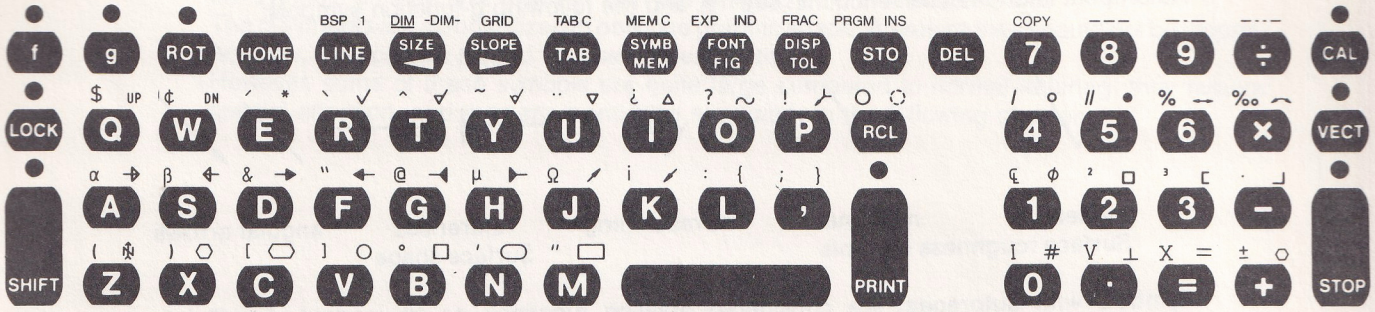
Note: Scriber 803 has 16 kbytes internal memory, but can be upgraded to 803A with 32 32 kbytes memory.

The internal memory is used for storing texts, which are frequently repeated.

The internal memory is used as a Memory-cassette in an internally connector 0 (zero)

The use of the internal memory is described in chapter 31.

4.4 Keyboard



Alpha-numeric keys

All alpha-numeric keys on the scriber are in dark grey colour, with white indications. When typing, one gets lower case letters in the display or simultaneous writing on the drawing.
The number keys are arranged in a numeric pad facilitating the use of the calculator (see 35).

Capital letters appear as on a typewriter when the ochre (SHIFT) key is depressed. Continuous capital letters can be used when the shift key is locked. This is done by depressing the (LOCK) key. Lamps indicate the set state of the keyboard.

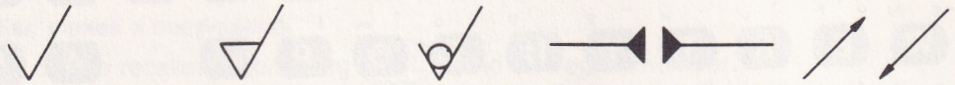
Using single finger entry (as on a calculator), a press on the (SHIFT) key will remain for the next key only, letting the choice be (LOCK) or a single capital letter. See also chapter 9.3.
The usual long space-bar is shortened and placed in the lower row after the letter M.

f- and g-functions

Letters, accents, symbols and signs in common technical use are placed as f- and g-functions on the scriber keyboard.
The f-functions contain real letters, accents and other symbols that are used in connection to writing, and they are treated as letters.
The g-functions are specialized, such as surface roughness symbols, arrows, frames and the like. Normally these symbols will not be in connection to a text, and some of them even end the pen far from the initial baseline. (Examples: angular arrows, roughness symbols.)
The f-functions connect to the alpha-numeric keys, and their sizes join the lettering height (see lettering SIZE 6) and the f-characters are sloped together with letters and numbers (see SLOPE 8).
Writing from FONT-cassettes, the f-function is changed together with the built-in ISO standard lettering.
The g-functions stand alone. They follow the lettering height SIZE and the slope SLOPE.
The g-functions remain unchanged by FONT changes, but they can be exchanged by means of SYMB-cassettes (see 28).
Some of the major g-functions are discussed in chapter 4.6.

4.5 Autorepeat

On the scriber the expression "Autorepeat" means that a line is drawn as long the key is depressed.
Autorepeat is on the line functions, see 19, and the following g-function symbols:



general machined no machining references angular arrows
Surface roughness symbols Surface shape

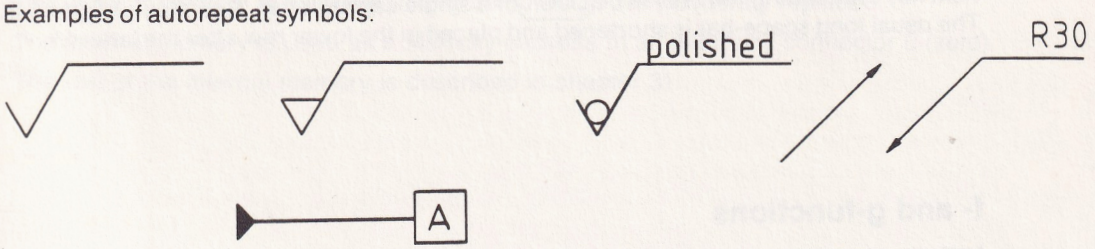
Symbols with autorepeat are considered drawing functions, to be made by careful key-pressing. Consequently they are not shown in the display, and can not be stored in registers or memory.

Utilizing the autorepeat function requires a little foresight. Always move the pen to a proper starting position, noting that the pen points at the arrow point, and considering that the symbol may be drawn to the left of the pen starting position.
Often go to 3rd or 4th line and at least 5 spaces to the right, when drawing surface roughness symbols. Move the pen using the VECTOR-function to a convenient starting position for reference marks and angular arrows.

Bent lines can be made by combining VECTOR and autorepeat, but the g-function-symbol should always be drawn first.

After an autorepeat, the pen remains above the line end point. Use VECTOR in STOP-mode to move the pen to fill in desired text or measures.

Examples of autorepeat symbols:



4.6 Symbols in g-function

These symbols are mainly drawing symbols, connectedto the lettering height and the normally used pendiameter. Consequently the g-function-symbols are proportioned to the lettering, and the symbols change size together with the lettering height selection SIZE.
The g-symbols are standardized in only one graphic shape; therefore they should not be sloped, however, they can be sloped for use on perspectives.
However, some of these symbols are quite large compared to normal lettering, they require special attention, and they are mentioned separately in the following chapters.

Surface roughness symbols

Seven surface roughness symbols are found on the keys (R) to (P).

As these symbols are standardized to be approx. 2½ times the lettering height, they should at least be drawn on the third baseline.
The pen points at the pointed end of the symbols, and the pen should be at least two spaces to the right on a line to allow for the drawing of a symbol.

The open roughness symbol indicates machining. It can be used alone, but normally a surface roughness value is indicated, in accordance to the national standard.
The symbol has autorepeat, and a bar is drawn as long as the key is depressed.
The symbol has no representation in the display.

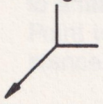
The closed roughness symbol indicates machining. Normally it has both roughness indication. roughness measurement indication and waviness indication in accordance with the national standard.
The symbol has auto-repeat, and a bar is drawn as long as the key is depressed. The symbol has no representation in the display.

The roughness symbol with a ball indicates no machining, but machining has been made at a previous state. Plating could be indicated.
The symbol has autorepeat, and a bar is drawn as long as the key is depressed.
The symbol has no representation in the display.

The machining triangle is an older symbol still in use in various industries (wood-working) or as agreed upon within company standards.
The pen moves a distance equal to the width of the symbol, and combined triangles are made by multiple depressions of the key.

The surface wave symbol indicates a non-machined surface by sandblasting or brushing. The symbol starts at the left end and is drawn above the baseline.

Fitting the symbol to a line above the symbol, press (g) (DN) 3 times first.



The chamfering symbol indicates precise chamfers according to DIN 6784. The indication is very practical, and thus included here. After drawing, the pen stops in position for writing a normal chamfering indication, however, if other positions are used, move the pen accordingly by space and UP or DowN.

4.6 Symbols in g-function (continued)

Ball and dot

o

The ball indicates points in diagrams, or is used as arrows on architectural measurements.
The ball size is 0,4 times the selected SIZE, or at 3.5 mm SIZE the ball will be 1.4 mm diameter.
There is no movement of the pen after a ball is drawn, consequently the entire scriber is moved by means of the track type drafting machine to place the balls correctly onto the drawing.

•

The dot indicates connection in diagrams. The dot also indicates reinforcement irons shown in section on concrete structural drawings. Also the dot is used as arrows on architectural drawings.
The dot is 0,3 times the selected SIZE, or at 3,5 mm SIZE the dot will be 1,05 mm diameter.
There is no movement of the pen after a dot is drawn, consequently the entire scriber is moved by means of the track type drafting machine to position the dots correctly in the drawing.

List of technical symbols

On key:	Symbol	Indication	Use:
			Reference to footnotes
1	℄	Centerline	Middle axis of large structure (Ships) Axis of rotation In simplified drawing: Mirror axis
1	⌀	Circular	Round material. Diameter
2	□	Square	Square material. Square format
3	⊏	Channel	Channel iron profile
−	⌟	Angular	Angular iron rolled profile
0	#	Number	Numbersymbol. Reference to notes
.	⊥	T	T-profile rolled iron Right angle in measuring Right angle structure
=	=	Parallel	Parallel
+	⬡	Hexagon	Hexagonal profile Organic chemistry molecule
Z	N	Northarrow	North arrow
E	*	Asterisk	Remark

4.7 mm/inch selection

mm selects the use of metric input. 0,01 mm increments are legal.
Increments smaller than 0,01 mm will be ignored.

Inch selects input dimensions regarding SIZE, CIRCLE (diameter), HIDDEN CIRCLE (diameter). DIM. .001" increments are legal.
The equivalents of typical metric dimensions are listed here:

METRIC	1	3,5	5	7	10	14	20	25	25,4	30	50
INCH	.040	.138	.197	.276	.394	.551	.787	.984	1	1.181	1.969

4.8 Writing speed - SPEED

SPEED regulates the pen-down writing speed. 100 % equals 40 mm per sec. and every step down reduces the writing speed 8 mm per second.
Adjusting SPEED can be practical for training in scriber operation, or for using drafting surfaces with less "take" where the ink line looks grey. Because of the lower voltage to the motors, the mechanical sounds will be different, and at 20 % almost every change in motor control can be heard.
Malfunctioning of seldom used pensizes, clogging of pens, and heavy pens require the use of slower penspeeds.
SPEED can be changed during writing, but will only be effective after the next pen-down movement.

4.9 Repetition - RCL

RCL recalls a text from a register. RCL can only do this when in STOP-mode.

RCL also recalls the last word written, when in PRINT-mode.
The scriber has a double display buffer, in which the program searches the last SPACE. The content after the space will appear in the display but because of the PRINT-mode, it will be written immediately.

Examples:

(RCL) Kitchen ( ) (SPACE) type: Garage (RCL) Garage

4.10 Drafting Limit

During writing and drawing the space nescessary for the next letter or figure is calculated, to check wheather it can be drawn inside the drafting limit.
An attempt to cross the drafting limit is indicated in the display: OUT OF FIELD
Error messages are cancelled by pressing any key, and the unwritten text appears in the display.
One must consider the reason for the error, and use HOME, LINE, SIZE or VECTOR accordingly to continue the writing.

Line limit

During writing, every linechange will be calculated and considered possible, however, without regarding decenders, but allowing numbers and upper case letters close to the drafting limit.
An attemt to cross the limit causes the printing to stop, the STOP-lamp will be lit and the display shows the error message:

OUT OF FIELD

AND THE REMAINING TEXT IS CANCELLED.

The user must press (PRINT) and (HOME)

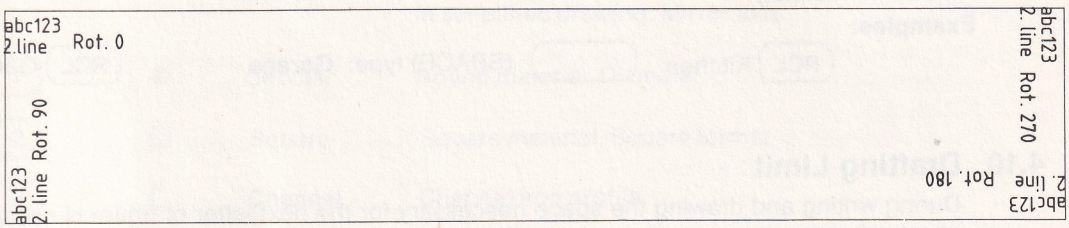
to enable the pen to write and relocate the scriber.
Point to the last line written, then begin writing with a line change to obtain a uniform line distance.

5. Starting point HOME

Homepositions:

HOME moves the pen to the left end of the first line. HOME is only executed in PRINT-mode.
The HOME position is calculated differently by each change of SIZE to allow the letters to be written on an invisible baseline starting from HOME.
HOME for 3,5 mm lettering height or less is 45 mm above the lower limit.
A HOME command is indicated in the display as ↖

HOME can be placed in a text, and is best used to end the text and bring the pen back to starting position.
HOME should always be used after each change of SIZE to allow for the new height of the letters.



HOME will be relocated by the function ROT (rotation) giving every direction of writing its own HOME positions.

HOME will be relocated as shown.

Pressing (LINE) the pen will move to the next line indicated 2. line in the illustration.

6. Lettering height/width SIZE

6.1 Lettering height SIZE

Åby Åby Åby Åby Åby Åby

Åby Åby Åby Åb

SIZE controls the lettering size. SIZE acts on the complete keyboard including f-and g- functions.
SIZE can be entered in 0,01 mm increments from 1.00 to 30.00 mm. (.040'' to 1.181'' in .001 increments). Only nescesserary decimals need to be entered.

For a decimal point use the (.) in the numeric pad.

After initialization the scriber has 3.5 mm size.

Example of key operations:

(SHIFT) (SIZE)

(1) (2) (.) (5)

(SHIFT) (SIZE) Size will be set to 12.5 mm.

NOTE:
SIZE assumes the use of pen diameters being 1/10 of size dimension. Pen movements are accordingly a centerline movement 9/10 of selected size. Changing SIZE and leaving the pen unchanged will make letters whose height differs from the selected SIZE.

Example:

SIZE 30 assumes the use of a non-existing 3 mm technical pen.
SIZE 30 makes 27 mm high capital letters + the pen diameter.
SIZE 30 combined with a 0.7 mm pen makes 27.7 mm lettering height.

Entering SIZE dimensions outside the 1.00 to 30.00 mm range gives the error message ILLEGAL SIZE, and the size will be reset to 3.5 mm.

Error messages are cancelled by pressing any button.

SIZE controls the line distance (see 7 LINE).

SIZE controls the figure scaling from cassettes (see 29 FIG).

6.2 Lettering width

The lettering width may be selected from 10 % to 200 % (1/10 compression to 2 × expension)

by pressing (SHIFT) (SIZE)

In the display is shown: SIZE 3.5 / 100 %

Change the width by pressing:

(f) (/) 75 (SHIFT) (SIZE)

and 75 % width is set.

This width remains until:

1) The scriber is shut off, by initialization 100 % is reset.
   or
2) A new SIZE is selected, width is reset to 100 %.

Width examples with comments

Condensed lettering 75%

To write 75 % width, use 1 size smaller pen, e.g. 0.25 mm instead af 0.35 mm.

Condensed lettering 50%

To write 50 % width, use 2 sizes smaller pen, e.g. 0.18 mm instead af 0.35 mm.

Condensed lettering 20%

To write 20 % width, use 3 sizes smaller pen, e.g. 0.13 mm instead af 0.35 mm.

Width can be used together with GRID obtaining correct pitch spacing for forms printed with 0,1 in = 2.54 mm or 2.6 mm pitch.

The procedure is given in 26.

7. Line change LINE

LINE moves the pen to the left and one line down. The ISO recommended line distance is 1,4 × lettering height.
LINE commands can be written into a text to change line, and indicated in the display as: ↵

The 1,4 ratio is the same as the pen diameter ratios (rounded values).

SIZE:	2,5	3,5	5	7	10	14	20	25	30	
LINE:	3,5	4.9	7	9.8	14	19.6	×	×	×	
SIZE	.040	.1	.125	.2	.25	.4	.5	.6	1	1.18
LINE	.056	.14	.175	.28	.35	.56	.7	.84	X	X

× = only one line is possible.

LINE commands forcing the pen lower than the writing area stop the scriber and have to be cleared by pressing (STOP) (STOP) before entering (HOME) to move the pen to a writing position.

7.1 Linespacing LINE

The linespacing may be read or selected independently by keying:
(SHIFT) (SIZE) (display) TEXT SIZE 3.5 (mm) (or inches)
Keying (LINE) displays: LINESPACE 4.9 (mm) (or inches)

To get 8.4 mm linespacing press (SHIFT) (SIZE) followed by 8 . 4
(in display) LINESPACE 8.4

Now you can correct it or enter this linespace by pressing (SHIFT) (SIZE)

the linespacing remains until a new SIZE is selected.

Text size 2,5mm
Linespacing 3,5mm

Linespacing 8,4mm

8. Lettering slope SLOPE

	DIGITAL	*DIGITAL*	*DIGITAL*	*DIGITAL*	DIGITAL	DIGITAL	DIGITAL	DIGITAL
SLOPE	90	75	60	45	135	120	105	90

SLOPE controls the lettering slope. SLOPE acts only on alpha-numeric keys and the f-function. The slope can be altered in 1 degree increments from 45° to 135° (= –45°).
Vertical lettering is 90° slope.
SLOPE different from 0° moves the pen to allow for the letter not to cross a proceeding vertical letter.

Example of key operations:

(SHIFT) (SLOPE) (displays ex) SLOPE 90 (degrees)
Keying (SHIFT) (SLOPE) to accept
or (1) (2) (0)
(SHIFT) (SLOPE) to have 30° backwards inclination

Key in any whole number between 45 and 135. Anything else gives error message ILLEGAL SLOPE, and SLOPE will be set to 90°.
Error messages are cancelled by pressing any buttom.
Drating limit clearance is only calculated for the original vertical letter.

9. Writing

Writing of text can take place directly in PRINT-mode - just like a typewriter - or indirectly in STOP-mode, where the text during keying in is shown on the display.

9.1 Direct writing PRINT

Pressing (PRINT) and having an empty display, changes the scriber to PRINT-mode.

The PRINT-lamp is lit, and the scriber acts like a typewriter.
During PRINT-mode up to 32 characters can be keyed in in advance of the present writing of the pen.
When the display content has been written, the display will be cleared.

9.2 Indirect writing STOP

Pressing (STOP) during writing stops the pen, in the first pen-up position to come, and the scriber changes to STOP-mode.

The remaining text is displayed.
The STOP-lamp is lit, and new text can be entered into the display.
STOP-mode can be pre-selected before entering a text thereafter to be written by pressing (PRINT)

9.3 Shift-and lock functions SHIFT LOCK

Changing to capital letters is achieved by pressing the (SHIFT) key.

Continue in capital letters by pressing (SHIFT) (LOCK).

The numbers are found on both lower case and upper case.

Single capital letters can be achieved by pressing (SHIFT) and the proper key.

The keys can be used in typewriter-mode, keeping the (SHIFT)-key depressed with one finger, while typing the capital letter word, or in calculatormode with typing the key entries in succession like:

(SHIFT) (S) (Y) (D) (N) (E) (Y) = Sydney

Similary, a down-lock is performed when in LOCK-state. Pressing the function unlocks only the next single key, and the LOCK-state reappears.

(SHIFT) (LOCK) (A) (SHIFT) (G) (S) = AgS

To unlock a LOCK-state, press (LOCK)

9.4 Accents

Accents are accessible through the f-key, which gives access to the orange characters above each key. These f-functions can be locked by the (LOCK) key.

Accents are typed in after the letter, and displayed after the letter also. However, they are written centered and elevated above the leading letter.

If in (SHIFT) (LOCK) state, the (f) -key and the accent can be pressed to get:

(SHIFT) (LOCK) (W) (A) (f) (¨) (L) (Z) = WÄLZ

10. Display read-out

The display reads:
1) Keyed in unwritten text, like letters and special characters.
2) Messages for selection of functions.
3) Error messages.

10.1 Dislay content control DISP

The display buffer contains 32 characters, consequently either first or second half will be shown.

Pressing (DISP) the display will jump 16 characters forward or backward to present the whole content.

DISP may be used for counting characters. If in STOP-mode 20 characters have been entered, only the last 16 characters are visible. Pressing (DISP) the display will show the last 16 of the 32 possible places.

When writing the scriber reads the display-buffer from the beginning.

10.2 Display Cancelling STOP

The STOP-key is the cancelling key.

Press (STOP) twice to clear the display.

During writing press the STOP-key three times, the first time to stop the pen, the next two to clear the display.

11. Correction keying errors DEL

Pressing (DEL) (delete) clears the last entry in the display.

DEL eliminates the last entry in the display. Always press (STOP) first. if an error has to be corrected. At STOP the display will show what is left of the display buffer content. Pressing DEL will eliminate – in succession from the last character – the characters in the display. and new entries can be made.

Pressing (PRINT) continues the printing.
DEL can be used during printing RCL-words:

(PRINT) (SHIFT) (LOCK) (U) (N) (I) (T) (1) = UNIT 1

(RCL) (DEL) (2) = UNIT 2

(RCL) (DEL) (3) = UNIT 3

Typing quickly or reducing the speed will allow longer changes of the last word accessible through RCL.

12. Backspace BSP

BSP (backspace) moves the pen to the starting point of the previous letter. The dimensions of the last 30 keystrokes are kept by the scriber for backspacing.
BSP can can be used in a text to repeat a letter, and BSP appears in the display as BS

Move the pen by TAB to allow for correction. After correction, press BSP a number of times until the pen is positioned in front of the latest correct letter. Repeat this letter and continue writing.

Backspacing to a forgotten accent, remember to repeat the letter itself in order to have the accent placed correctly.

The backspace register is cancelled using

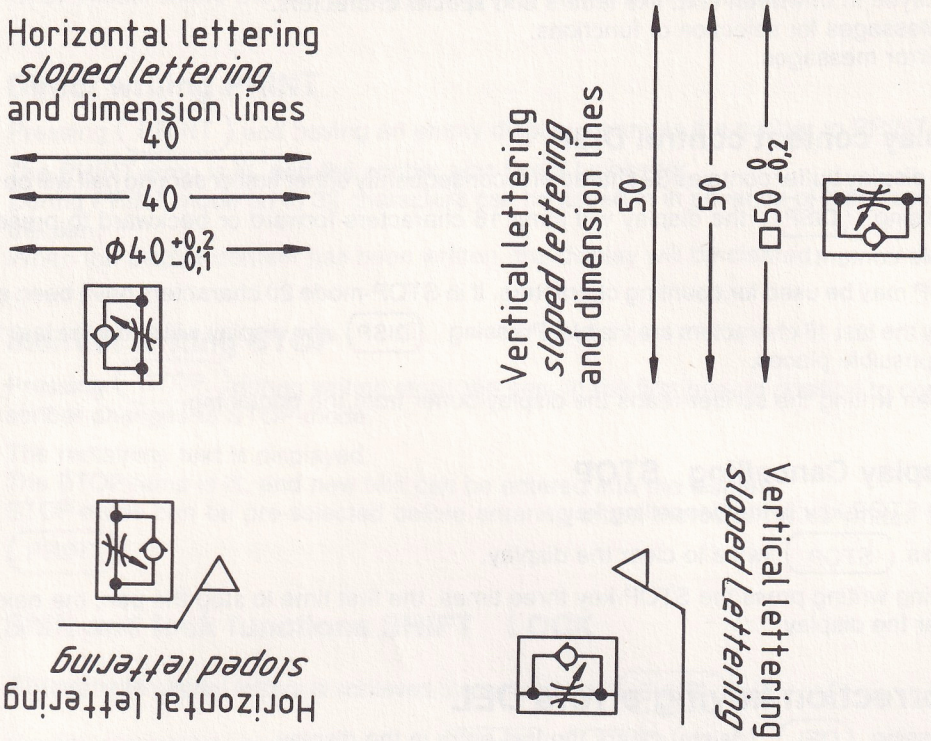
HOME FRAC TOL IND and EXP

Backspacing takes place on the textbaseline. Arrows and symbols which do no end on the baseline, can not be backspaced correctly.

.1 BSP is backward travel in steps of 1/10 of SIZE, allowing **kerning** of letters
(A V A to be AVA)

13. Rotation of lettering and figures ROT

The ROT-key may appear indicated as VERT (Vertical) on some units



ROT allows rotation of the base line in stops of 90°.

Pressing (ROT) , the display shows:

DIRECTION 0°

Keying (ROT) 90 (ROT)

the display will shows: DIRECTION 90°

and text and figures are turned 90° counter clockwise.

Keying (ROT) 270 (ROT)

the display will shows: DIRECTION 270°

and text and figures are turned 90° clockwise.

The ROT-lamp is lit when other directions than 0° are active.

HOME will be relocated as shown in chapter 5.

Rotation cancels by pressing (ROT) 0 (ROT) and the lamp is switched off.

14. Exponent and indices EXP IND

m^2 cm^2 m^3 °C Uranium^{235} 123^{456} abc^{defg} $15^{k\Omega}$ $N^{\#}$ $^{\bullet}45$ $G^{[a2,6]}$

EXP enters exponent-mode into the scriber. The base-line is elevated 0.8 × lettering height. and the lettering height is reduced to 0.5 × selected SIZE.

Exponent-mode is entered by typing (f) (EXP), and the display reads E_X.

All alpha-numeric, f- and g-characters are legal.

Exponent-mode is cancelled by typing (f) (EXP), and the display reads: E_X.

The pen is transferred to the previous selected baseline.
Frequently used exponents such as ² and ³, are found above the keys (2) and (3).

H_2SO_4 abc_{defg} 123_{456} $N_{\#}$ $Q_{\leftarrow}$ R_{vvv} $17_{(5672)}$ V_{GG}

IND enters indices-mode into the scriber. The base-line is lowered 0,3 × lettering height. and the lettering height is reduced to 0,5 × selected SIZE.

Indices-mode is entered by typing (f) (IND), and the display reads: I_N

All alpha-numeric, f- and g-characters are legal.

Indices-mode is cancelled by typing (f) (IND), and the display reads: I_N

The pen is transferred to the previous selected baseline.

15. Change of baseline UP DN

V_{Gg} V_{CC} 123456789 $\sqrt{\frac{3,6}{4172}}$ $\frac{1268}{}$ $\left\{\begin{matrix}1\\2\\3\end{matrix}\right\}$

Pressing (g) (UP) or (g) (DN) change the base-line to 1/5 the lettering height up or down.
Up and down are used to move the pen correctly according to baselines. measuring lines or surface symbols, leaving the scriber in a fixed position.
Furthermore the up-and-down keys extend the possibilities of matching printed frames on forms.

16. Brackets

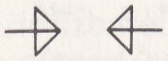
The scriber contains three different types of brackets:

( ) [ ] { }

The curvy brackets connect three lines, pointing from the middle one; consequently. this symbol can not be drawn on first or last line, as the pen will stop at the drafting area "fence".

17. Arrows

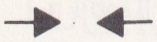
Open arrows



Above the buttons (A) and (S) are two open arrows, indicating section on building drawings. In mechanical engineering the open arrow indicates the location for hardness test and used in VERTical-mode the open arrow can indicate level in control engineering.
The pen points at the arrowpoint.

Using the right-pointing arrow above (A) the pen has to be moved at least 4 spaces to the right to allow for the drawing to the left of the arrow point.

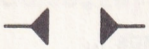
Filled arrows



Above the keys (D) and (F) are two blocked arrows, indicating sections on machine drawings, direction of flow in pipe diagrams, direction of movement on instruction drawings, upward direction of stairs on building drawings.
The pen points at the arrowpoint.

Using the right-pointing arrow above (D) the pen has to be moved at least 4 spaces to the right to allow for the drawing to the left of the arrow point.
The blocking is made by a pattern of lines placed in a distance to ensure a perfect fill-in even by using a pen of 1/14th of the lettering size equal to a 0,25 mm pen by 3,5 mm lettering height.

Reference indications



Above the keys (G) and (H) are two reference indications used for geometrical tolerancing in mechanical drafting.
Both indications have autorepeat.
The pen points at the intersection between surface and the reference line.

Using the indication above (G) the pen has to be moved at least 4 spaces to the right, to allow for the drawing to the left of the reference indication.
As the symbols have autorepeat, they have no indication in the display.
The blocking is made by a pattern of lines placed in a distance to ensure a perfect fill-in even by using a pen of 1/14th of the lettering size equal to a 0,25 mm pen by 3,5 mm lettering height.

Angular arrows

Above the keys (J) and (K) are two arrows drawn 45° to the baseline.

They are useful for indicating radii of contours, or combined for diameter measurements.
The pen points at the arrowpoint.

Using the angular arrow above (J) the pen has to be moved at least 4 spaces to the right to allow for the drawing to the left of the arrow point.
The angular arrows have autorepeat and the stem is continued as long as the key is depressed.
The angular arrows have no display indication.

Straight double arrow

Above the key (L) is a double-arrow indicating reciprocating motion.

The double-arrow is drawn from the left arrow-point.

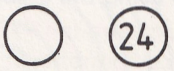
Curved double arrow

Above the key (,) is a curved double-arrow indicating a swinging reciprocating movement.

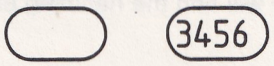
The curved double-arrow is drawn from the left arrow-point.

18 Frames

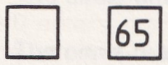
Frames are larger than letters, and requires the pen to be moved to the second line.
The size of the frames are 2×(200%) of lettering SIZE.



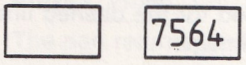
Partnumber circles are drawn with a diameter to fit 2 characters. The circle is drawn from the intersection of the lettering base-line and the vertical left tangent-line, making vertical or horizontal rows of position numbers feasible.
After completing the circle, the pen moves to the starting point of the first of two characters within the circle, however, a single character can be fitted in the middle, by depressing the space bar first. If necessary, use the .1″ backspace for centering a single character.



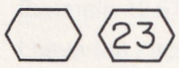
The oval frame is made in the same manner as partnumber-circle.
The oval contains 4 characters. Three characters are centered by a leading single space. two characters can be centered by making two spaces. The oval frame normally surrounds control measurements. Again use the .1″ backspace for centering.



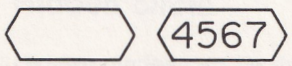
The square frame is drawn to fit 2 characters. The square is drawn from the intersection of the lettering base-line and the left side, making vertical or horizontal rows of squares feasible.
After completing a square, the pen moves to the starting point of first of two characters within the square, however, a single character can be centered by making two spaces first.
The square frame can be used for tolerances of form and position, or for framing reference numbers.



Rectangular frame is drawn in the manner described above, but contains 4 characters.
The frame is drawn containing theoretical measurements, but can be used for tolerances of form and position as well.



The hexagon frame is drawn to fit 2 characters. The hexagon is drawn from the intersection of the lettering base-line and the left side, making vertical or horizontal rows of hexagons feasible. After completing a hexagon, the pen moves to the starting point of first of two characters within the hexagon, however, a single character can be centered by making two spaces first.



Long hexagon frame is drawn in the manner describer above, but contains 4 characters.

A complete selection of frames for tolerances of form and positions is found at the SYMBOL—CASSETTE »Geometrical tolerances«.

19. Line types

Threre different line function are found on the keys (8) (9) and (÷)

All lines are made with a reduced speed, to allow for precise stops.

Using the f-key or (f) (LOCK) will draw the lines to the left, and using the g-key or

(g) (LOCK) will draw the lines to the right.

The smallest lineincrement is 1/5 of SIZE. The length of the dashes are controlled from the selected SIZE to preparation in dashes to the lettering height.

The drawing speed is reduced to ease stopping at a pre-selected point. Release the key approx. one letterheight before end of the line.
With a little practice this way of control is easy and the user will find the handling easy.

A continuous line is made by use of VECTOR, see 24.

The lines are made with the aid of an autorepeat function, and the lines continue as long as the key is depressed.

Dashed line for invisible contours, or control pipes in diagrams.

Dash-dot line for centerlines in drawings.

Dash-double-dot-line for section-lines in drawings (Some national standards differ on the use of dash-double-dot-lines).

We recommend the use of a hand-held pen and the scriber ruler when drawing common straight lines. However, the use of line-function is recommended for the dashed linetypes. as the dash-length is very uniform, and highly enhances the drawn image.

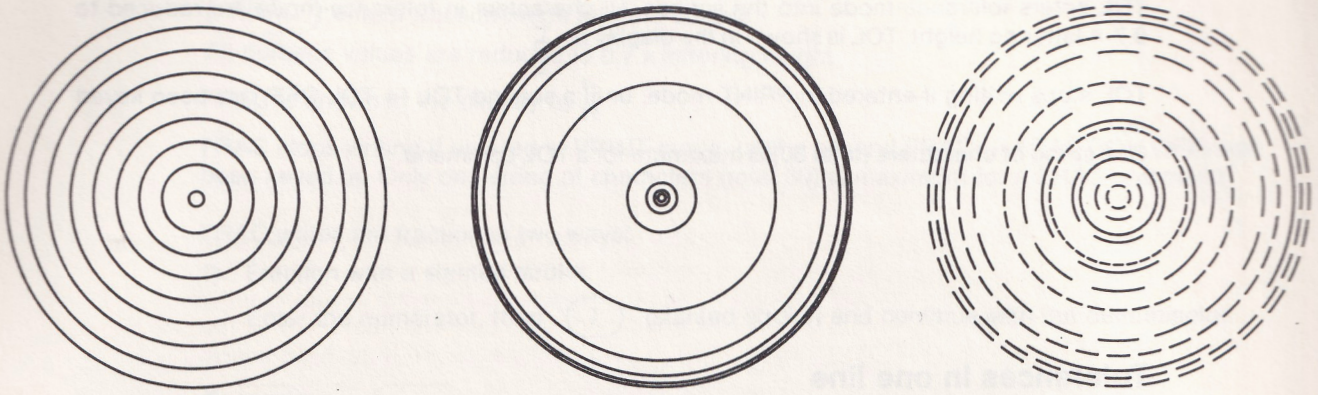
Discontinuing dashed lines in the first half of a dash or dot may cause the pen to remain in the down position because of the automatically generated pen-down command still being valid.
Lift the pen in several ways:

1) Press (STOP)
2) Continue the line type to first pen-up, if applicable.
3) Gently lift the scriber using the right handle, and continue the line until next pen-up.

Other line-like drawings are ..... or –x–x–x–x–x or =========

Note: All lines are considered drawing functions to be made by careful key-pressing. They are not shown in the display, and can not be stored.

20. Circles



20.1 Full circle

Circles from 1 to 50 mm in diameter can be drawn by the scriber.

The circle drawing program is called by pressing (PRINT) (f) (RCL).

The circle-drawing symbol is an orange circle. The display reads: CIRCLE. The pen moves to the circle-center, located at x25, y25 mm. (X1.0 Y1.0 in).

Type in the diameter. One or two decimals are legal, if entered with the numeric pad decimal point. Entries can be corrected by (DEL) and a renewed entry. Minimum diameter is 1.00, and maximum dia. is 50.00 mm. (.040 to 1.969 in).

Press (PRINT) to have the circle drawn.

The pen returns to circle center.

Repetition by pressing (PRINT).

Concentric circles can be made with a new keying sequence:

Example 12.57 mm. (1) (2) (.) (5) (7) (PRINT)

Leave the circle function by pressing. (f) (RCL)

Smaller or bigger than legal diameters give the error message: ILLEGAL DIAMETER.

The error message can be cancelled by pressing any key.

20.2 Hidden circle

Hidden circles can be drawn from 1 to 50 mm (.040 to 1.969 in) by the scriber.

The hidden circle program is called by pressing (PRINT) (g) (RCL).

The hidden circle drawing symbol is a blue dashed circle located above the RCL button. The display reads: HIDDEN CIRCLE. The pen moves to the circle drawing center. see CIRCLES above.

Type in the diameter. Then press (PRINT) to have the hidden circle drawn. All other uses are exactly like using the circle program.

The length of the dashes is controlled according to the selected SIZE. The best proportion between dash-length and pendiameter can be selected by changing SIZE. For simplicity there are 5 basic dash-lengths, and their lengths change at 3 . 6 . 12. and 20 mm SIZE. However, the program calculates the precise dash-length and dash-distance to fit the diameter. According to diameter the program also reduces the practical number of dashes in the circle.

Circles and hidden circles can be drawn concentric, keeping the scriber in a fixed position.

After each circle the scriber goes back to normal writing mode.

21. Tolerances TOL

TOL enters tolerance-mode into the scriber. All characters in tolerance-mode are reduced to 0,7 × lettering height. TOL is shown in the display as ⌶

TOL stops writing if entered in PRINT-mode, until a second TOL (= TOL OFF) has been keyed in.
One string of characters (total 30) is maximum for a TOL command.

Tolerances in one line

Example: $45 \pm 0,2$

(4) (5) (H) (7) ((TOL) (0) (.) (0) (1) (2) (TOL)) = 45 H7(0,012)

Tolerances in two lines

TOL writes tolerances in two lines, aligned according to the decimal point. The first values are entered in the upper line, the last values are placed in the lower line. The tolerance programme assumes a space or minussign to separate the two lines.

Example: $45^{+0,123}_{0,002}$ 3.002 / 2.997

(4) (5) (TOL) (+) (0) (,) (2) (—) (0) (,) (1) (TOL) = $45^{+0,2}_{-0,1}$

(4) (5) (TOL) (H) (7) ( ) (j) (6) (TOL) = 45^{H7}_{j6}

(4) (5) (TOL) (+) (2) (,) (5) ( ) ( ) (TOL) = $45^{+2,5}$

(4) (5) (TOL) ( ) ( ) (—) (2) (,) (5) (TOL) $45_{-2,5}$

Note: If the content of upper or lower line is replaced by (SPACE) (= nothing) only the other entries will be written - elevated or lowered.

A Tolerance-indicator can not be cleared by the DELETE-key, but requires a final TOL-keyed in (=TOL OFF), or pressing the STOP-key twice.

22. Fractions

(FRAC) enters fraction-mode into the scriber.

All numeric values are reduced to 0.7 × lettering height.

FRAC is shown in the display as $\frac{F}{R}$

FRAC stops writing if entered in PRINT-mode, until a second FRAC (= FRACTION OFF) has been keyed in. Only one string of characters (total 30) is maximum for a FRAC command.

FRAC writes the fraction in two ways:

1) Fraction with a slanted stroke:

Enter the numerator, then (/) (slanted stroke) and continue with the denominator.

Example:

(2) (f) (FRAC) (3) (3) (f) (/) (1) (2) (8) (f) (FRAC) = $2^{33}/_{128}$

The numerator will be elevated 3/10 of the character height, reduced to 7/10 of the character height. The slanted stroke will be a normal one.

The denominator will be reduced to 7/10 of character height and printed on the base line.

2) Fraction with a division bar:

Enter the numerator, then the bar (−) (= minus) and continue with the denominator.

Example:

(2) (f) (FRAC) (3) (3) (−) (1) (2) (8) (f) (FRAC) = $2\frac{33}{128}$

The numerator will be elevated 6/10 of the character height and reduced to 7/10 of the character height. The bar will be drawn to fit the numbers used, and the denominator will be descended 4/10 of the character height and reduced to 7/10 of the character height.

The fraction will appear centered.

ERRORS: If FRAC-mode is entered by error, it can be cancelled by a second FRAC, or by pressing STOP twice.

Fractions in dimensions, see chapter 23.

23. Dimensions DIM

Dimensions can be made manually using arrow-keys or automatically using the DIM-functions.

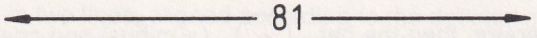
23.1 Arrow heads

The function keys marked arrows will make a standard measuring-line arrowhead, starting from the arrowpoint.
The keys have autorepeat, and a line is drawn from the arrow, as long as the key is depressed.
The arrows have no representation in the display.
The opposite arrowhead can be made by quickly pressing the opposite arrow key.

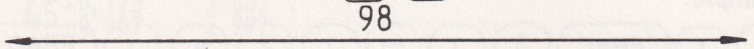
As arrows for measurement are drawn with a pen usually 2 sizes smaller than the used lettering requires, the pen should be changed. The arrowhead fill-in-pattern is fine enough to block the arrow.

23.2 Manual dimensions

Using the arrow keys, dimensions can be made.
The measurement can either be written between the arrow lines.



by lowering the lettering baseline by keying (g) (DN) twice or the measurement can be elevated above the arrow line by keying (g) (UP) twice.

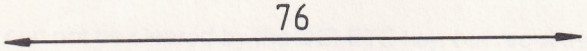


Use the track type drafting machine to move the pen to the middle of the line.

23.3 Automatic continuous dimensions DIM

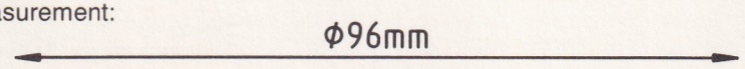
The automatic dimensions is called keying (f) (DIM)
A dimension line is drawn according to the setting of the mm/inch selector.

The display will read: DIMENSION
and the pen will move to the left and approx. 5 mm up.
Then type in the desired distance between 12 and 250 mm (0.5 to 9.842 inch) and a complete measuring line will be made, accurately centering the measurement.

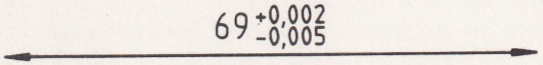


Using larger SIZE, the minimum measurement increases.

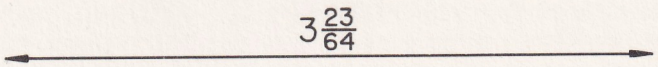
A text can be added before or after the measurement, however, limited to 6 characters preceeding the measurement:



Tolerances can be added to the measurements, obeying the rules of tolerance indications given in 21. The tolerance will not affect the length of the line.



A fraction (normal or decimal) can be entered in the measurement, and the length of the line made accordingly.



DIM can be used in VERT-mode also with 50 mm as maximum distance.

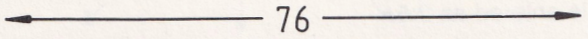
23.4 Automatic broken dimensions –DIM–

The automatic dimension is called keying (g) (–DIM–)

A broken dimension line is drawn according to the setting of the mm/inch selector.

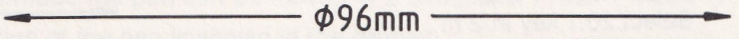
The display shows: DIMENSION
and the pen moves 25 mm (1 inch) up in the drawing area.

Key in the length between 20 and 250 mm (.75 to 9.842 inch) then press (PRINT) to have a precise dimension with a centered measurement.

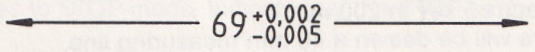


If SIZE is increased the minimum measurement is increased.

A text can be added before or after the measurement, however, limited to 6 characters preceeding the measurement:

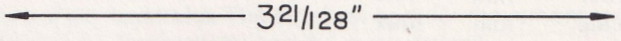


Tolerances can be added, obying the instructions for tolerances, see section 21



–DIM– can be used in VERT-mode also, having 50 mm (1.969 in) as largest measurement.

A fraction (normal or decimal) can be entered in the measurement, and the length of the line made accordingly.



Error messages

If the space between the arrow heads is too short for the measurement, an error message is displayed: ILLEGAL DIM.

Also if the length exceeds 250 mm (9.842 in).

The error message can be cancelled by pressing any key.

23.5 Omitting the measurement

An accurate dimension line without measurement can be had, pressing (STOP) before the second arrowhead is drawn.
The pen will return to the left arrowpoint without writing the measurement.

Example: (f) (DIM) (9) (0) (PRINT) (STOP)

Example: (g) (–DIM–) (9) (0) (PRINT) (STOP)

23.6 Text in dimensions

The text entered including the measurement numerals is limited to 30 characters, however limited to 6 characters preceeding the measurement.
Long texts increases the minimum dimension length as the text have, to fit between the arrow heads.

23.7 Tolerances and fractions in dimensions

Tolerances are not considered when writing the dimension-arrow length.
Tolerances increase the minimum practical measurement while the measurement and the tolerances are assumed to be written between the arrowheads.
Fractions are considered in the length of measuring lines e.g. 2½ inch, if the mm-inch selector is in inch. Fractions are keyed in according the rules in chapter 22.
Decimalfractions are considered in the length of the measuring line.

23.8 Scales

common for **DIM** and –DIM–.

Scaling dimensions other than 1:1 is done so: (assume DIM-mode)

Press (SHIFT) (SIZE) display: DIM SCALE 1:1

Now scales between 100:1 and 1:100 can be keyed in ending with (SHIFT) (SIZE)

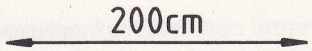
Leaving DIM-mode the scale will be set to 1:1.

Note: USE ONLY WHOLE NUMBERS!

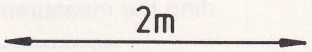
The scale 1:2,5 is entered as 2:5.

10:1 to 1:1000 can be had by using cm or meters:

Example: Scale 1:50 200 cm
Select 1:5 key in 200 cm
there will be drawn a 40 mm measuring line.



Example: Scale 1:50 2 m
Select 20:1 key in 2 m
there will be drawn a 40 mm measuring line.



Example: Scale 1:5000 200 m
Select 1:5 key in 200 m
there will be deawn a 40 mm measuring line.

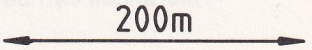


Table of scales

Minimum and maximum measurements.

Drafting Scale	Enter Scale	mm min.	mm max.
100:1	100:1	0.15	2.5
50:1	50:1	0.25	5
20:1	20:1	0.6	12.5
10:1	10:1	1.2	25
5:1	5:1	2.4	50
2:1	2:1	6	125
1:1	1:1	12	250
1:2	1:2	24	500
1:5	1:5	60	1250
1:10	1:10	150	2500
1:20	1:20	300	5000
1:50	1:50	750	12500
1:100	1:100	1500	25000
1:200			
1:500			
1:1000			
1:2000			
1:5000			
1:10.000			
1:20.000			
1:50.000			
1:100.000			

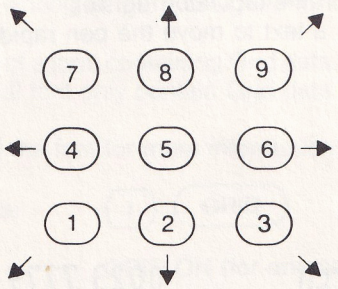
Enter scale Scale	cm min.	cm max.
100:1	0.15	2.5
50:1	0.25	5
20:1	0.6	12.5
10:1	1.2	25
5:1	2.4	50
2.1	6	125
1:1	12	250
1:2	2.4	500
1:5	60	1250
1:10	150	2500
1:20	300	5000
1:50	750	12500
1:100	1500	25000

Enter Scale	m min.	m max.
100:1	0.15	2.5
50:1	0.25	5
20:1	0.6	12.5
10:1	1.2	25
5:1	2.4	50
2:1	6	125
1:1	12	250
1:2	24	500
1:5	60	1250
1:10	150	2500
1:20	300	5000
1:50	750	12500
1:100	1500	25000

Drafting Scale i.p.f.	Enter Scale	ft min.	ft max.
3	3:1	0.2	3.28
1 1/2	3:2	0.4	6.56
1	1:1	0.5	9.84
3/4	3:4	.75	13.12
1/2	1:2	1	19.68
3/8	3:8	1.5	26.24
1/4	1:4	2	39.37
3/16	3:16	3	52.49
1/8	1:8	4	78.74
3/32	3:32	6	104.98
1/16	1:16	8	157.48

Drafting Scale inches	Enter Scale	in min.	in max.
1/4	1:4	2	39.37
1/8	1:8	4	78.74
1/12	1:12	6	118
1/16	1:16	8	157.4

24. Vectorfunction VECT



In Vector-mode the pen can be moved in 8 directions. Press (VECT), the lamp is lit, and the position of the pen is shown in the display

Example: X=000.0 Y=45.0

The scriber changes to STOP-mode, indicated by the STOP-lamp.

Selecting Vector, the pen jumps to the nearest intersection of an imaginary 0.1 mm GRID.

Pressing the keys 1 - 9, the pen moves in 8 directions.

The pen moves on an imaginary 0.1 mm grid. The smallest horizontal-vertical movement is 0.1 mm, obtained by a short keystroke. The smallest angular movement is 0.14 mm, corresponding to the combination of 0,1 horizontally and 0.1 mm vertically.

Changing to PRINT-mode the pen will draw lines as long a the key is pressed. By longer movements the drafting speed is raised. Precise stop can be made by releasing the key and press again. The following 5 mm movement will be with low speed, allowing precise stops. Eventually one might step to a stop using 0.1 mm moves.

The key (5) lowers the pen to make a dot. May also be used for shaking the pen.

25. Tabulator TAB

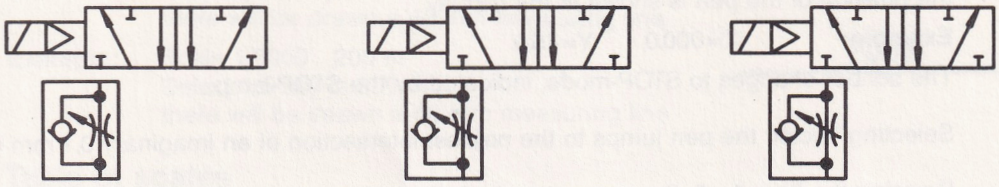
TAB (Tabulator) moves the pen to next tabulator stop.
30 tabulator stops can be kept in the tabulator register.
Tabulator stops can be used in a text to move the pen rapidly to a precise stop, and TAB is indicated in the display as: T B

25.1 Common use

writing parts lists:

19	3	Microswitch	0023 7779 0032	dept. E
18	2	Cam	0023 7779 0256	dept. M
17	9	Screw M4x10	0055 7779 3793	

for drawing diagrams:



25.2 Setting and cancelling stops

TAB settings can only be made when in VECTor-mode. Pressing (6) to move the pen to the right. and pressing (TAB) at the stop positions enter the tab stops. TAB is only functioning in the X-axis.

Setting tabulators are shown in the display:

(Example 120 mm) TAB POS X = 120.0

Tabulators can be cleared individually. Move to the tabulator, press (VECT) and (f) (TAB C) the display shows DELETE ALL? Y/N

Press Y to have all tabulators deleted or

press N to clear appointed tabulator only.

Press (VECT) to terminate the Vector-function.

TAB positions are only kept for the immediate use, and disappear when the scriber is switched off.

25.3 Tabulatorstops in text

TAB-indicators can be entered as spaces in any text.

During writing the scriber by reading a TAB-indicator, will go to the next stop. If no TAB-stops are set, the pen will continue to the right and stop.

Cancel the TAB command by pressing the STOP-key 3 times, press (PRINT) and (HOME) to move the pen to the starting point.

TAB-indicators can be stored in Memory but assume the stops to be preset to operate during writing.

Programmed tabulatorstops in memory-texts:

Tabulators can be programmed in conjunction to a text in memory, se section 32.8.

26. Grid mode GRID

GRID makes all characters in lower case, upper case and f-case to fit a uniform pitch. allowing writing in columns or writing on form designed for type writers.

Grid assumes the use of a font, containing Grid data. The technical fonts for 803 has total GRID, wheras some graphical font only contain Grid data for numbers and signs.

See the menu.card of the font for more information.

Call in the GRID-mode: (f) (GRID)

Display: GRID ON (for one second)

Call off the GRID-mode: (f) (GRID)

Display: GRID OFF (for one second).

GRID example:

```
23456789
11111111
44444444
98765432
1,2.3-4/
```

Normal comparison:

```
23456789
11111111
44444444
98765432
1,2.3-4/
```

GRID can be controlled from Memory, allowing normal text but numbers in Grid, quite usefull for parts lists. Grid then appears in the display as G_r

Example of GRID

```
6   12   Screw   M12×40
5    8   Screw   M 8×30
4   16   Screw   M 6×30
```

Parts lists combined normal text and numbers in GRID.

```
6   12   Screw   M12×40
5    8   Screw   M 8×30
4   16   Screw   M 6×30
```

GRID- for fitting in on forms.

Fitting a text on a 2.54 mm pattern (10 pitch on a typewriter) the lettering height and width are calculated as follows:

From the menu-card: ISO 3098 B has 7.94 mm GRID at 10 mm lettering.

GRID on 3.5 mm SIZE = 7.94 · 3,5÷10 = 2.78 mm

Nescessary width 2,54÷2,78 = 92 %

Lettering height without regarding SIZE 2,54÷7.94 · 10 = 3.2 mm.

27. Lettering cassettes FONT

FONT is a typographic expression for a complete set of lead types within a given typographic style (e.g. Helvetica, Antikva).

Font-cassettes allow the change between technical lettering and graphic fonts.

Changing FONT replaces all lettering-drafting data connected to the keys in lower case and in upper case (SHIFT) and all f-functions.

Font-cassettes are issued regularly. Ask your dealer for a complete list.

The font of the scriber is inserted in connector 1. Only the font in connector 1 will autumatically become activated when the scriber is switched on.

Exchange of font from connector 1 may take place before switching on, or by pressing (STOP) extracting the cassette and typing (SHIFT) (FONT) (1) the display will show:

FONT NO 1

the cassette diode is lit and the display shows: WAIT.

When transferred the name of the font will show in the display.

27.1 Latin fonts

Different fonts can replace the font inserted in connector 1, by inserting a FONT-cassette in one of the connectors, and calling this connector by typing:

(SHIFT) (FONT) followed by the connector-number (3 in the following examples).

The display will read: FONT No 3 and the cassette diode is switched on, and WAIT appears in the display.

Then the name of the font appears in the display:

Font: DIN 17 (DIN 17 is an example)

and remains for operator information until first depression of any key.

All the following writing will be made in the DIN 17 lettering style.

Linex 803 scriber with DIN 17 font

By changing to SLOPE 75 the letters are transformed to DIN 16 style.

DIN 16 with SLOPE set to 75°

Return to the font in connector 1 by typing: (SHIFT) (FONT) (1).

and the display will read: UNIVERSAL (an example)

until first depression of any key.

27.2 Non-Latin fonts

Changing to cassettes containing non-latin fonts reguires transfer of new display data, in order to visualize the new alphabet. During the transfer period the display reads:

WAIT

and the letters are transformed one by one as the display character becomes ready. After completed transfer – duration time approx. 4 seconds – the display will read:

Example: РУССКИИ АЛФАВИТ (cyrillic example)

The keys of the keyboard change letters according to the national keyboard layout – the keys will act as a Russian typewriter in this case.
The new letters and their positions are shown on a keyboard header. The new letter appears above the key, and in case of replacing the f-functions, the new f-functions are shown also, as orange indications on a green base, covering the basic f-function indication.
Some alphabets require more keys than the English-Latin keyboard on the scriber. In this case seldom used characters are placed as f-functions above the keys, or close to the keys, where these characters belong.

The keyboard overlay is supplied with the corresponding cassette.

Returning to ISO 3098 B from non-Latin fonts is a little unusual.
Press (SHIFT) (FONT) and the display will read:

ПЗЬН Ь3 (cyrillic example)

which has no meaning. The message reads FONT NO but spelled in a foreign alphabet with the keys (F) (O) (N) (T) (N) (O). The user can verify by checking the word letter by letter.
Instead of wasting time by deciphering, simply type: (SHIFT) (FONT) (1) and the display data will change. During the change the display will read the word:

УЫЩН (cyrillic example)

which gradually transforms as the display characters become ready.

After completed transfer, the display will read the name of the font:

UNIVERSAL FONT (Universal example)

and the keyboard header can be removed.

A similar change can be made to any other FONT-cassette, using the proper connector-number.

Error messages

Non-latin messages in the display can be translared using the following procedure:

1. Note the message
2. Translate the characters of the display - one by one - using the overlay as indicated to the corresponding Latin letters found on the keys.
3. Read the message
4. Act accordingly

We recommend frequent used messages to be written and kept as a guide for the user.

Available FONT-cassettes:
FONT-cassettes are issured regularly. Ask your dealer for a complete list.

28. Symbol-cassettes SYMB

Symbol-casettes are called by pressing (SHIFT) (SYMB) and the display reads:

SYMBOL CASSETTE NO

and the connector number into which the cassette is placed, should be pressed. The name of the cassette will appear until cancelled by pressing any key.

SYMBOL-cassettes exchange the complete contents of the g-functions.
The new symbols are shown on a header, placed on the keyboard.

Some of the g-function are connected to the individual key,

like lines on the keys (8) (9) (:)

or autorepeat on the keys (R) (T) (Y)

and (G) (H) (J) (K)

and UP and DOWN functions on the keys (Q) (W)

and COPY on key (7)

The remaining 30 keys will draw any figure or symbol programmed into the cassette, by depression of a single key.
The seven autorepeat keys can be changed also, preferably to symbols requiring autorepeat.
Like the built-in g-functions, the symbol cassette will show a simplified sign in the display for each key.

The g-functions and symbols are related to the letters in scale, and all g-functions can be changed by the use of SIZE, and sloped by means of SLOPE.

The g-functions containing autorepeat can not be shown in the display and are considered to be drawn directly under finger-on-the-key-control like lines.

Return from a symbol cassette to built-in symbols by typing:

(SHIFT) (SYMB) and the display reads: SYMBOL CASSETTE NO

Now type (O) for the built-in symbols or the slot number in which another SYMBOL-cassette is placed.

The display reads: INTERNAL SYMBOLS

or the name of the new cassette.

SYMBOL-cassettes are issued regulary. Ask your dealer for a complete list.

Note: Symbolcassettes must only be changed when the scriber is switched off.

29. Figure-cassettes FIG

FIG stands for FIGURE-cassettes, which is called by the (FIG) key.

Figure-cassettes can be placed any of the 4 cassette connectors, and caled by the FIG-key:
The display shows: FIGURE CASSETTE NO,
and the connector number should be entered (example: 3).

At the same time the pen travels to the figure center at X 25,00 Y 25,00 mm (approx. X 1, Y 1 inch). And if there is a figure-cassette in connector no. 3, the display reads:
FIG 3 100 % No.

Now the figure-number can be keyed in

Figure numbers are one-digit 0-9, two-digit 11-99 or three-digit 100-250. Press PRINT to draw the figure.

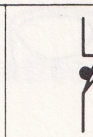
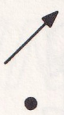
For user convienience the numbers 0-9 normally are used for stepwise figure movement see 29.2.

Press (PRINT) to have the figure drawn.

Repeat the figure by pressing (PRINT) again.

29.1 Starting point of figures

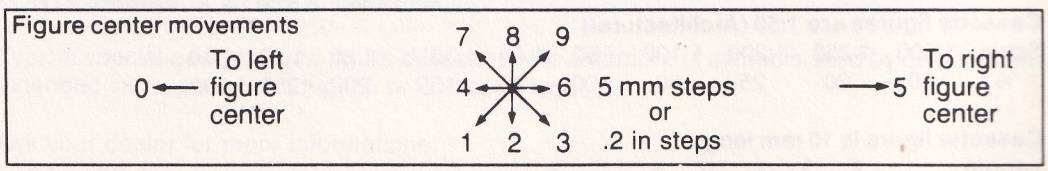
The figure-cassette menu contains all figures, their starting-point and endpoint, if this is different from the starting-point.

114		120		126		132		138	
115		121		127		133		139	

29.2 Moving figures

Figures can be moved by means of VECTOR.

Stepwise figure movement are placed on the first 9 figures.

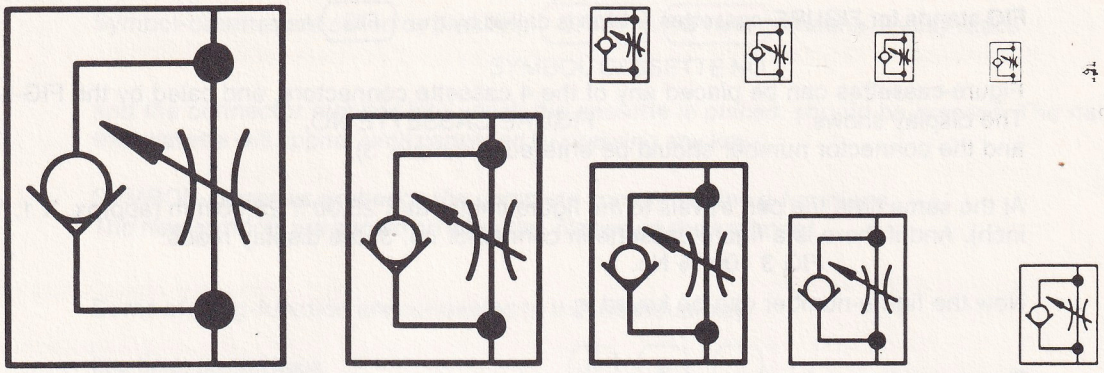


The left figure-center is located at x 25, y 25 mm (x 1, y 1 in).
The right figure-center is located at x 225, y 25 mm. (Tolerance $^{+0}_{-0.1}$, depending of the cassette)

The steps in center movement are usually in fractions of the figure-size.

Figures can be positioned using tabulator, see 25.1

29.3 Scaling figures



On a figure-cassette menu-card are listed the figures, the starting point, and the end-point, if different from the starting point.
The menu shows the figure or symbol shape in the normal size equal to 100 % figure scale.
Figures can be scaled up or down using the SIZE-key. The display reads: FIGURE SIZE, and the user types the desired scale between 10 and 500 %.

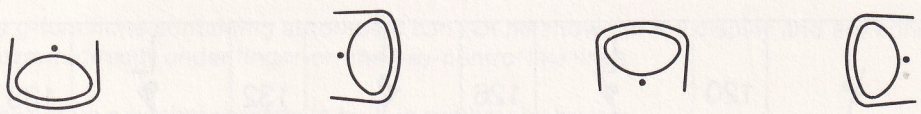
NOTE: The SIZE is in FIG-mode independent of the selected lettering height, which is kept unchanged!

Press (SHIFT) (SIZE) to enter the scaling command. Then the new scale will remain on until changed or the scriber is shut off.

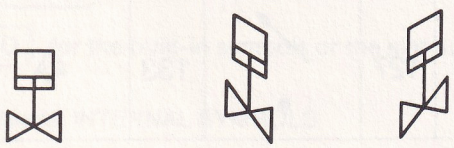
Changing to another cassette will not affect the figure SIZE setting.

The display continuously shows the selected cassette, figure-size and figure number. The figure can be repeated immediately by depressing (PRINT).

All figures can be rotated by depressing (ROT) and selecting direction.



All figures can be sloped (Isometric, Dimetric).



Using slope, the drafting limit clearance is only calculated for the unsloped figure.

Drawing oversize figures we recommend a trial drawing to check if the starting point needs repositioning.

To clarify the relations between percentage scales and technical scales, here are the most used scales:

Cassette figures are true size:

Scale:	1:10	1:5	1:2,5	1:2	1:1,5	1:1	2:1	3:1	4:1	5:1
%	10	20	40	50	67	100	200	300	400	500

Cassette figures are 1:50 (Architectural)

Scale:	1:500	1:250	1:200	1:100	1:50	1:40	1:33 1/3	1:25	1:20	1:10
%	10	20	25	50	100	125	150	200	250	500

Cassette figure is 10 mm long:

Length:	1	2	3	4	5	6	7	8	.....	49	50	mm
%	10	20	30	40	50	60	70	80		490	500	

Cassette figures are 1/4 i.p.f. = 1/48

Scale:	1/16	3/32	1/8	3/16	1/4	3/8	1/2	3/4	1	1 1/2	3	i.p.f.
Scale:	1/192	1/128	1/96	1/64	1/48	1/32	1/24	1/16	1/12	1/8	1/4	in
%	25	38	50	75	100	150	200	300	400	—	—	

All figures programmed can be drawn inside the drafting area, however, by scaling, many figures will be drawn outside the drafting area. If appropriate, some menus will contain information on the maximum scaling for certain figures.
Some figures are drawn centered around the starting point, but due to scaling, the 25 mm to the left of the figure center is too little. In this case use figure 6 to move the pen to right before selecting the figure number.

Some figures are drawn from their lower left corner, but due to scaling, the 25 mm above the figure center is too little. In this case use figure 2 to lower the pen before selecting the figure number.

Note: The usual size of center movement figures, 5 mm, is also changed by FIGURE SIZE, to make 10 mm at 200 % etc.

29.3 Scaling figures (Continued)

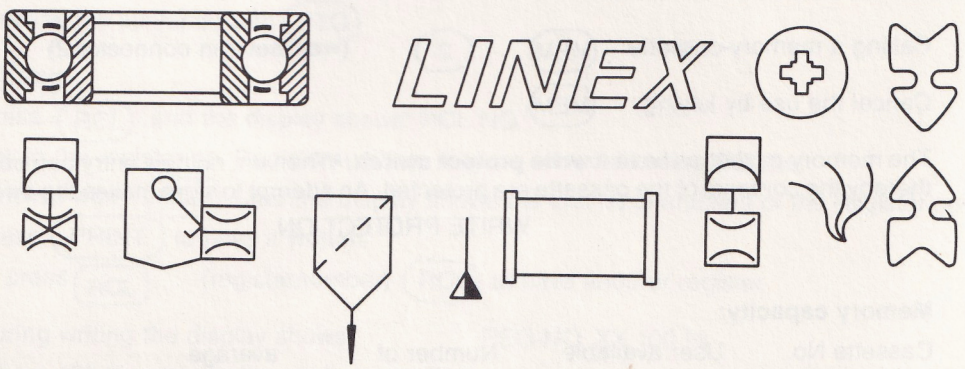
Errors:

By selecting a wrong cassette type:	The display reads:	ILLEGAL CASSETTE.
By selecting a non-existing figure:	The display reads:	ILLEGAL FIG.
By selecting an empty connector:	The display reads:	NO CASSETTE.

Clear the error message by pressing any key.
If figures are drawm outsidethe drafting area, the pen stops at the drafting limit. Then cancel the figure by leaving the cassette, and call the cassette on again: Press (FIG) to leave, and (FIG) to enter and continue with connector number and figure movement number.
Now move the scriber to have the pen aimed at the figure starting point, call the figure number, depress (PRINT) and make the complete figure.

Important: Most figures are programmed according to their template counterpart. Pencil sketches can be made easily by using the LINEX template indicated on the figure-cassette menu.

30. Special-cassettes



Special-cassettes are custom made. Special-cassettes can be made like FIGURE-cassettes, FONT-cassettes or SYMBOL-cassettes.

Typical special-cassettes are figure-cassettes with a number of symbols used by one company extended with special description or company logo.

Ask your dealer for more informations.

31. Memory function MEM

The memory is a permanent storage, containing text or figures as keystrokes, each being one byte.

The memory is supported by a battery back-up capable of 5 years lifetime.

Memory-cassettes have the battery expiority-date indicated at the connector.

A memory may be built-in or as a cassette, both perform in the same way.

31.1 Internal memory

The internal memory may contain 16 kbyte = 14.000 keystrokes in type 803, or 32 kbyte = 28.000 keystrokes in type 803 A.

Internal memory is called (MEM) (0) (Zero)

Cancel the use keying (MEM)

The battery's condition is controlled during the start and if the battery needs replacement the display will show:

BATT. LEVEL LOW

See a serviceman for exchange.

31.2 Memory-cassettes

Memory-cassettes are in 2 capacities:

Memory 2	4 kbyte = 3500 keystrokes	Ordering number: 11311
Memory 4	16 kbyte = 14760 keystrokes	Ordering number: 11331

Memory-cassettes are placed in the cassette-connectors and are called by the connector-number 2, 3 or 4.

Calling a memory-cassette: (MEM) (2) (=cassette in connector 2)

Cancel the use by keying (MEM)

The memory-cassettes have a **write protect switch.** When on, no new entry can be made, and thereby the contents of the cassette are protected. An attempt to store makes the error message

WRITE PROTECT ON

Memory capacity:

Cassette No.	User available bytes	Number of user registers	average size of registers bytes
MEMORY 2	3500	100	32
MEMORY 4	14760	100	128
802/16 kbytes	14760	100	128
802/32 kbytes	29400	100	256

The size of a register will be regulated automatically.
Every register contains 32 bytes minimum, but one register may contain the complete memory, if the text is long enough.

If the memory is full, the display shows:

MEMORY FULL

31.3 Formating registers

The formating organizes the registers of the memory, and allocate numbers to the registers.
Every memory has 100 registernumbers allocated, from 00, 01, 02, ..., to 99.
The formating is normally made by LINEX.

If a memory should be cleared completely, a new formating - **that clears all registers** - can be made by keying:

(MEM) (connector number) (f) (MEM C)

The display shows: FORMAT MEMORY? Y/N

The user may continue by pressing (Y) (yes), or regret by keying (N) (no).

This keying sequence is only valid just after calling a memory.

The programme is automatic. The formating is completed within one second.

Thereafter the memory may be used.

Error message: A non-formated memory/memory-cassette is displayed as
FAULTY CASSETTE

31.4 Keying in and writing a text

Call memory by keying (MEM) (connector number),
the display shows USER MEM NO. and an internal (0) or cassette is chosen (2, 3, 4)
where xxxxx is the number of unoccupied bytes (keystrokes) in the memory.

Enter a text

Press (STO) and the display shows: STO NO (xx), where xx is the next unoccupied register.
Key in the register no., which appears after the bracket. Number may be corrected using DELete.
Finalise the register selection by pressing (STO)
Key in the sentence. Practically end with HOME to bring the pen back to the starting point.
Finalise the sentance with (STO)

Writing:

Press (RCL) and the display shows: RCL NO
Key in the register no. Registernumbers may be corrected using DELete.
Finalise with (RCL), and the display shows the first 16 characters of the reigister content.
Press (PRINT) to have it written.
or press (RCL) (registernumber) (RCL) to have another register.

During writing the display shows REG-NO. XX 100 %
Where 100 % refers to the scaling, see 31.6.
Repeat the sentence by pressing (PRINT)

Stop the writing by pressing (STOP)

After a STOP the register must be called again.

31.4 Keying in and writing a text (continued)

Display control

The writing can be made with display control, by which the next 15 characters are presented running in the display, by keying (L) (listing) before pressing the PRINT-key. Writing may then be stopped by pressing (STOP) and writing may be continued by pressing (PRINT)

Location of text

In STOP-mode all facilities for locating the text inside the drawing area are accessible:

HOME LINE VECTOR ROT SIZE SLOPE GRID

Checking registers

The content of a register may be displayed rolling by calling the register and then press (E) (edit) and roll by means of the arrow-keys.
Checking must be terminated by (STO)

The register content can be rolled automatically through the display, calling the register and using the Pseudoprint function (Non-print) see 31.7

31.5 Corrections in a text

Editing of the text in Memory-Cassettes is possible both when the text is drawn/ listed and after it is stored.

Cursor is movable by means of the arrow keys: (◄) (►)
The letter pointed out will flash.
The text is rolling through the display, when you keep pressing the key.

Delete The chosen letter deleted by means of the (DEL)-key

Correction Point the letter with the cursor and key in the correct letter.

Insert Press (g) (INS) and write the additional text. Finish by pressing (g) (INS).

Parameters SIZE (height) SIZE (width) SLOPE, LINE and GRID can be entered in a text to emphazice it, using the normal syntax:

Example: (SIZE).4(SIZE) PART (SIZE).2(SIZE) 345 = PART$_{345}$

After use the parameters are automatically reset to the previous manually selected values GRID, however, only changes state, every time a GRID-indicator is read.

Editing after Storage

A stored register appears by pressing (RCL)-key and Reg. No. (RCL)
Then press (E) (Edit), and all the above facilities are available.

Finish editing by pressing (STO).

NOTE! (DEL) (delete) does not work in INS (insert-mode).
If deleting necessary, press (g) (INS), then point out the wrong letters by means of the cursor, and delete by pressing (DEL).
Via (g) (INS) a re-insert is possible.

Find text

A text search function is available.
The register is called (RCL) Reg.no. (RCL)
Press (F) (for Find) and the display shows: FIND
Now key in the sequence of characters to search for.
Up to 30 characters may be used. Terminate with (PRINT)
The editing function is available.
After FIND or EDIT bring the text into the register by pressing (STO)

Error message: TEXT NOT FOUND

Cancelling a register

The register is called and cancelled so:
Press (STO) and the display shows: STO NO (37)
where 37 is the next unoccupied register.

Key in the registernumber to be cancelled e.g. (2) (7)
and the display shows: STO NO (37) 27
Terminate with (STO)

As register 27 is occupied, the display shows

DELETE REG Y/N

Press Y for yes or N for no.

At the pressing on Y the register is cancelled.

If the cancelled register have to be used immideately key in text or programs.
Terminate with (STO)

Cancelling of a cassette

Explained in formating 31.3

31.6 Conditions for writing

Change of lettering height or slope

In a memory text the lettering height SIZE or the inclination SLOPE may be changed by the following syntax:

(SHIFT) (SIZE) (lettering height) (SHIFT) (SIZE)

(SHIFT) (SLOPE) (inclination in degrees) (SHIFT) (SLOPE)

Shown in the display or written by listing of the memory content:

Si7.5Si SL65SL

After writing the register content manipulating SIZE or SLOPE, the scriber restores the previous values.

Scaling of writing

Memory text scal-
ing on the S-key.

Memory text scal-
ing on the S-key.

Memory text scal-
ing on the S-key.

The comple content of a register may be scaled simultaneously, so:

Call the register, press (S) (scale)

the display shows: REG-NO XX YYY %

where XX is the registernumber and YYY is the scaling referring to the latest entered value. The scaling may be changed from 10 to 500 %.

Press (PRINT) for writing in the new scale.

The chosen scale is valid as long as the same register is used. Changing to another register resets the scale to 100 %, however, pressing the S-key again assumes the previous used scale, for rapid continuation of scaled texts.

31.7 No print

No print means writing with the pen elevated. Hereby space requirements for texts or figures are estimated, or line changes are set properly.

No print can only be performed on text/figures stored in the memory.

Call the register, press: (P) (PRINT)

The no print mode cancels automatically when the register is ended or if a new register is called.

Examples of use of no print:

(RCL) xx (RCL) (P) (PRINT) in display: REG-NO: xx 100 %
allows checking of space for a text/figure.

(RCL) xx (RCL) (S) (P) (PRINT) in display: REG-NO: xx yyy%
allows checking of space for a selected text/figure.

(RCL) xx (RCL) (L) (P) (PRINT) the text will roll in the display allowing checking the text or separators.

One may this easily stop at the line change and check the position of the pen. It might be practical reducing the writing speed.

32. User-programming of figures

The »PROGRAMME« function on key (PRGM) enables that text entries in program mode are drawn like a figure or listed as drafting commands.

During the entry of the programme, linenumber promts are automatically given.

Linenumbers start with 10 for every new PROGRAMME and will automatically increment with 10.

Some rules to follow

Do not use the space bar, when keying in the commands. The space after the line number is automatically generated by the scriber. Put only one command on the line.

All commands are ended by pressing (LINE) . The display will show the line indicator followed by the next linenumber and space. **Programs can only be generated when in Memory.**

To create a program, press (MEM) (connector no.) (STO) x x (STO) (f) (PRGM) where connector no. is 0 for internal memory, or 2, 3, 4 for memory cassettes and x x is the register no. where the figure is to be stored.

Now simply type in your commands, one command per line, finish each command with (LINE)

To end a program, type (f) (PRGM) , and save the program by pressing (STO)

Note that you can have an unlimited number of programs within the same memory register.

32.1 Programme instructions

Programme Commands	**Key Code**	
Programme start	(f) (PRGM)	
Move (absolute movement) only with the pen raised	M X... Y...	(Upper or lower case letters may be used).
Stop (pen waits)	S	
Down (pen down)	D	
Up (pen up)	U	
Incremental Movement: to draw lines or move the pen		
Line in x-direction	X...	
Line in y-direction	Y...	
Line in slope direction	X... Y...	
Circle	C X...	(X = Radius)
	C Y...	(Y = Radius)
Circular arc programme 1 Indicating circle enter		
	C C X...	
	C C Y...	
Indicating circular arc	C C X... Y....	
	C R X... Y... (clockwise, right)	
	C L X... Y... (counter-clockwise, left)	
Circular arc programme 2		
1/4 circle clockwise	C R X... Y...	
1/4 circle counter-clockwise	C L X... Y...	
Circular arch start on axis	C R X... Y... R...	
	C L X... Y... R...	
Circular arc ending on axis	C R X... Y... I... J... R...	
	C L X... Y... I... J... R...	
Circular arc between axis	C R X... Y... I... J... R...	
	C L X... Y... I... J... R...	
Full speed	F	
Programme end	(f) (PRGM)	

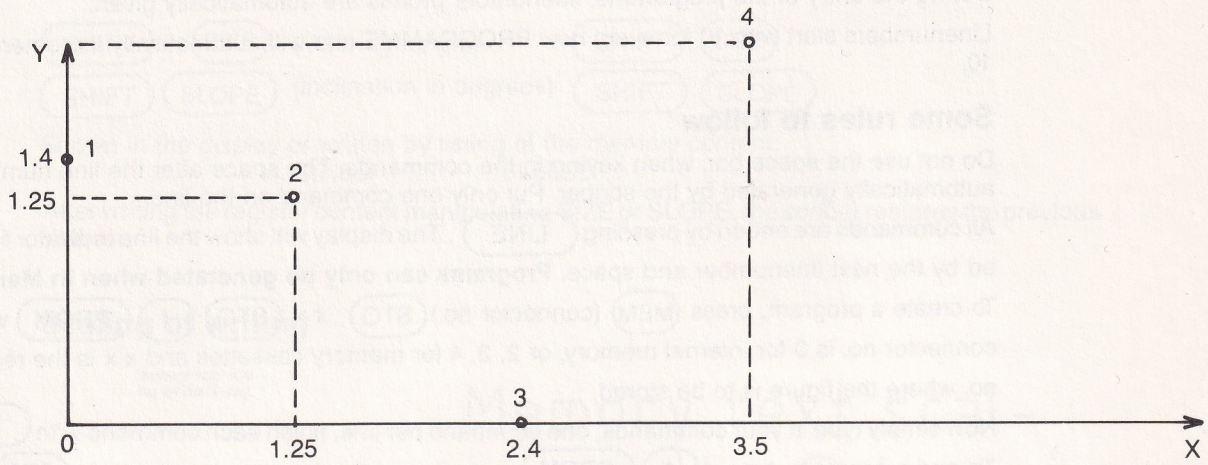
Programme end automatically makes the pen up - movement.

The dimensions are entered in mm without decimal, or by using the decimal point in 1/10 or 1/100 mm. Or in inches without the decimal, or by using the decimal point to .001 in.
Use only a maximum of 5 digits inclusive of the decimal point.

Text in figures can be placed with absolute position by means of MX... Y..., and must be written outside the programme - see 32.2.5.

32.1.1 Absolute/incremental moves

Absolute Movement



The absolute movements in the drawing field are considered from the lower left corner and are indicatd M.

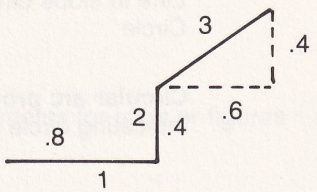
Example:
Point 1 equals M X 0 Y 1.4
Point 2 equals M X 1.25 Y 1.25
Point 3 equals M X 2.4 Y 0
Point 4 equals M X 3.5 Y 1.96

The absolute movements are used for positioning in the drawing field before drawing/typing start.

Incremental Movements

Incremental movements are used for drawing of figures and indicate the movement of each single line:

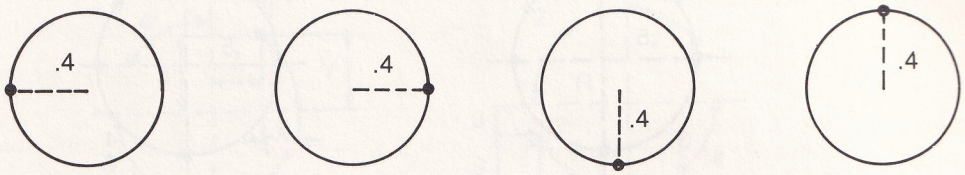
Example:
Line 1 equals X .8
Line 2 equals Y .4
Line 3 equals X .6 Y .3



32.1.2 Circle

Circle is indicated C, and a full cirle is drawn clockwise. The pen points at the circle axis, contrary to the circle programme built in the scriber.

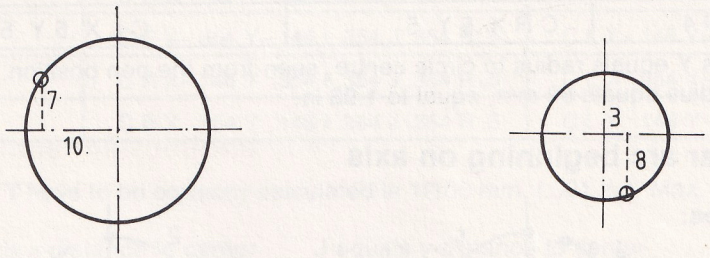
Examples:



CX .4 CX–.4 CY .4 CY–.4

X or Y to be equal to the radius to the circle center, seen from pen position.
Max. radius equals 25 mm (50 mm diameter), equal to .98 in (1.96 in. dia.).

Circle with arbitrary starting point.
Circles may be drawn without indicating the radius. (Metric example).



C X 10 Y-7 C X-3 Y 8

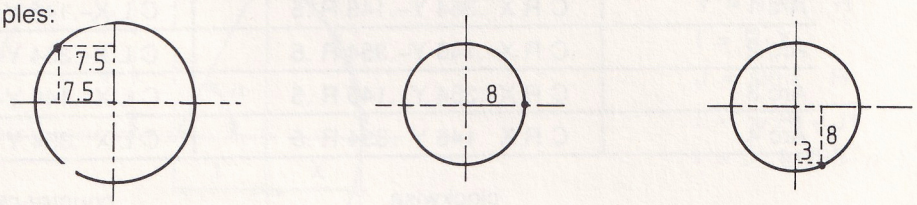
(Radius = $\sqrt{10^2+7^2}$ = 12,2) (Radius = $\sqrt{3^2+8^2}$ = 8,49)

Circular arc programme 1

32.1.3 Indicating the circle's centre

A circle's centre is indicated incrementally in relation to the pen's position.

Examples:



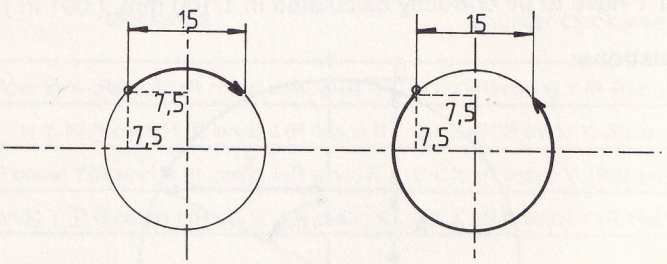
C C X 7,5 Y-7,5 C C X-8 C C X-3 Y 8

The radius is calculated by the program.

32.1.4 Circular arcs with indication of the circle's centre

When the circle's centre is known, the arc may be indicated in coordinate values.

Examples:



	clockwise	counter-clockwise
1. Line: center	C C X 7,5 Y-7,5	C C X 7,5 Y-7,5
2. Line arc	C R X 15 Y 0	C L X 15 Y 0

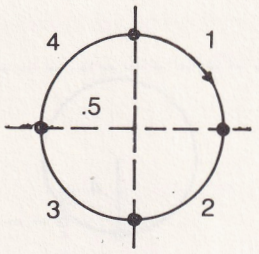
Indicating of circles centre is only nescessary when drawing arcs.

Circular arc programme 2

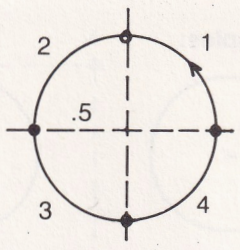
32.1.5 ¼ circle

quater-circles are drawn from axis to axis.

Examples:



clockwise



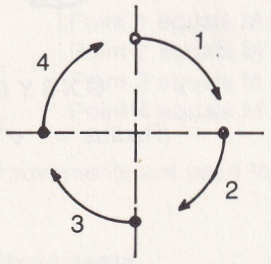
counter-clockwise

¼ cirkel 1	C R X .5 Y–.5	C L X–.5 Y .5
¼ cirkel 2	C R X–.5 Y–.5	C L X–.5 Y–.5
¼ cirkel 3	C R X–.5 Y .5	C L X .5 Y–.5
¼ cirkel 4	C R X .5 Y .5	C L X .5 Y .5

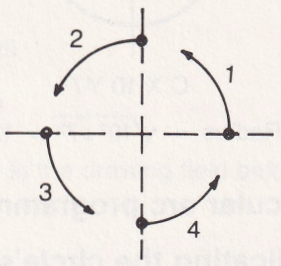
X equals Y equals radius to circle centre, seen from the pen position.
Max. radius equals 50 mm, equal to 1.96 in.

32.1.6 Circular arc beginning on axis

Examples:



clockwise



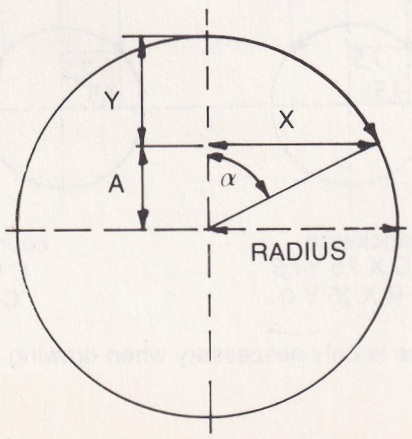
counter-clockwise

Arc 1	C R X .354 Y–.146 R .5	C L X–.146 Y .354 R .5
Arc 2	C R X–.146 Y–.354 R .5	C L X–.354 Y–.146 R .5
Arc 3	C R X–.354 Y .146 R .5	C L X .146 Y–.354 R .5
Arc 4	C R X .146 Y .354 R .5	C L X .354 Y .146 R .5

	clockwise	counter-clockwise
Arc 1	C R X (Rsinα) Y-(R-Rcosα) R	C L X-(R-Rcosα) Y (Rsinα) R
Arc 2	C R X-(R-Rcosα) Y-(R sinα) R	C L X-(R sinα) Y-(R-Rcosα) R
Arc 3	C R X-(R sinα) Y (R-Rcosα) R	C L X (R-R cosα) Y-(R sinα) R
Arc 4	C R X (R-Rcosα) Y (R sinα) R	C L X (R sinα) Y (R-R cosα) R

X and Y have to be correctly calculated in 1/100 mm, (.001 in.). Max. radius: 590 mm. (23 in.).

Calculations:



$X = \sin\alpha \quad R$

$Y = R - \cos\alpha \quad R$

$X = \sqrt{R^2 - (R-Y)^2}$

$A = \cos\alpha \quad R$

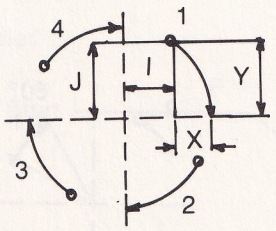
$X = \mathrm{tg}\alpha \quad A$

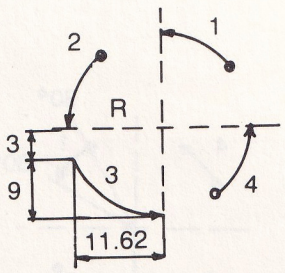
Limits on values of X, Y, R
X+R < 650 mm (25.59 in)
Y+R < 650 mm (25.59 in)

Circular arc programme 2

32.1.7 Circular arc ending on axis

Examples:





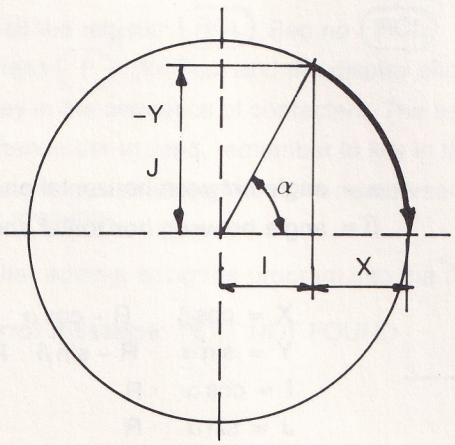
clockwise counter-clockwise

Arc 1	C R X .146 Y–.354 I .354 J .354 R .5	C L X–.354 Y .146 I .354 J .354 R .5
Arc 2	C R X–.354 Y–.146 I .354 J .354 R .5	C L X–.146 Y–.354 I .354 J .354 R .5
Arc 3	C R X–.146 Y .354 I .354 J .354 R .5	C L X .354 Y–.146 I .354 J .354 R .5
Arc 4	C R X .354 Y .146 I .354 J .354 R .5	C L X .146 Y .354 I .354 J .354 R .5

X and Y have to be correctly calculated in 1/100 mm, (.001 in.). Max. radius: 590 mm. (23 in.).

I equals x-distance to center J equals y-distance to center

Calculations:



$X = R - \cos\alpha \quad R$

$Y = \sin\alpha \quad R$

$I = R - X$

$J = \sin\alpha \quad R$

$I = \sqrt{R^2 - J^2}$

$I = J \cdot \mathrm{tg}\,(90 - \alpha)$

Limits on values of X, Y, I, J and R
X+I+R < 650 mm (25.59 in)
Y+J+R < 650 mm (25.59 in)

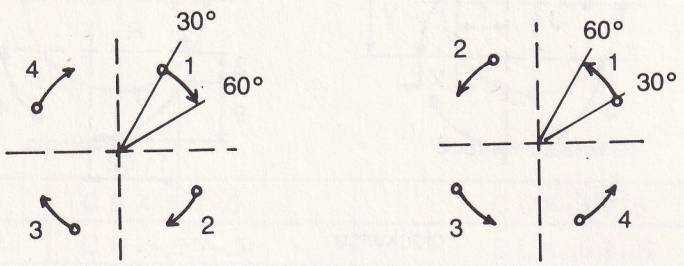
clockwise counter-clockwise

Arc 1	C R X (R-Rcosα) Y–(Rsinα) I (R cosα) J (R sinα) R	C L X–(R cosα) Y (R-Rsinα) I (R cosα) J (R sinα) R
Arc 2	C R X–(Rsinα) Y–(R-R cosα) I (R sinα) J (R cosα) R	C L X–(R-R sinα) Y–(Rcosα) I (R sinα) J (R cosα) R
Arc 3	C R X–(R-R cosα) Y(R sinα) I (R cosα) J (R sinα) R	C L X (R cosα) Y–(R-R sinα) I (R cosα) J (R sinα) R
Arc 4	C R X (R sinα) Y (R-R cosα) I (R sinα) J (R cosα) R	C L X (R-R sinα) Y (R cosα) I (R sinα) J (R cosα) R

Circular arc programme 2

32.1.8 Circular arc between axis

Examples:

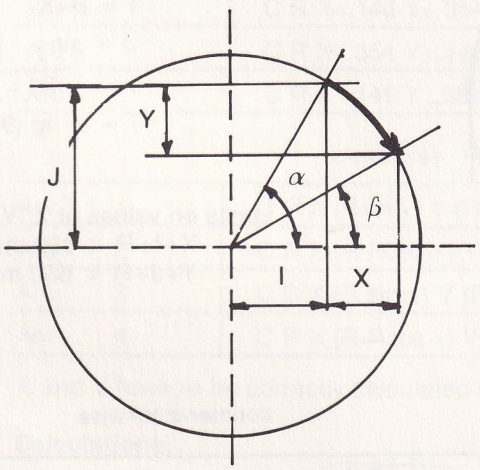


clockwise | counter-clockwise

Arc 1	C R X .183 Y–.183 I .250 J .433 R .5	C L X–.183 Y .183 I .433 J .250 R .5
Arc 2	C R X–.183 Y–.183 I .433 J .250 R .5	C L X–.183 Y–.183 I .250 J .433 R .5
Arc 3	C R X–.183 Y .183 I .250 J .433 R .5	C L X .183 Y–.183 I .433 J .250 R .5
Arc 4	C R X .183 Y .183 I .433 J .250 R .5	C L X .183 Y .183 I .250 J .433 R .5

X, Y, I, J and R have to be correctly calculated in 1/100 mm, (.001 in.). Max. radius: 590 mm. (23 in.).

Calculations:



α = angle between horizontal and arc starting point.
β = angle between horizontal and arc ending point.

$X = \cos\beta \cdot R - \cos\alpha \cdot R$
$Y = \sin\alpha \cdot R - \sin\beta \cdot R$
$I = \cos\alpha \cdot R$
$J = \sin\alpha \cdot R$

Limits on values of X, Y, I, J and R
X+I+R < 650 mm (25.59 in)
Y+J+R < 650 mm (25.59 in)

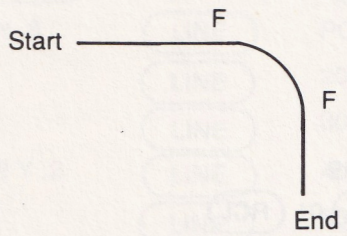
clockwise | counter-clockwise

Arc	1	CRX(Rcosβ-Rcosα) Y–(Rsinα-Rsinβ) I (Rcosα) J (Rsinα) R	CLX–(Rcosα)-Rcosβ) Y (Rsinβ-Rsinα) I (Rcosα) J (Rsinα) R
Arc	2	CRX–(Rcosα-Rcosβ) Y–(Rsinβ-Rsinα) I (Rcosα) J (Rsinα) R	CLX–(Rcosβ-Rcosα) Y–(Rsinα-Rsinβ) I (Rcosα) J (Rsinα) R
Arc	3	CRX–(Rcosβ-Rcosα) Y (Rsinα-Rsinβ) I (Rcosα) J (Rsinα) R	CLX(Rcosα-Rcosβ) Y–(Rsinβ-Rsinα) I (Rcosα) J (Rsinα) R
Arc	4	CRX(Rcosα-Rcosβ) Y (Rsinβ-Rsinα) I (Rcosα) J (Rsinα) R	CLX(Rcosβ-Rcosα) Y (Rsinα-Rsinβ) I (Rcosα) J (Rsinα) R

32.1.9 No Deceleration (full speed)

The programme of the scriber allocates automatically an acceleration at the beginning of a line and deceleration at the end of a line.
Tangential movements into or from circular arcs can be drawn at (full speed), by using the command F.

Example:



D (pen down)
X 20 F
C R X 10 Y – 10 F
Y – 10
U (pen up)

32.1.10 Programme lines

The programme of the scriber allocates automatically line numbers from 10 to 990 to the entered programme codes. The line numbers enable the refinding of the lines and are a great help in correcting or changes of the figures.

32.1.11 Find programlines

Programlines can be found for eventual changing by means of the EDIT-function, see 31.5.

Lines may be found by using the FIND-function:

Call the register (RCL) Reg.no (RCL)
Press (F) (for find) and the display shows FIND.
Key in the sequence of characters. The sequence may be the linenumber, however, if only the linenumber is used, remember to key in the space after the number, to avoid finding a coordinate value containing the same numbersequence. End with (PRINT) , and the EDIT-function is available.

After editing, bring the program into the register by pressing (STO)

Error message: TEXT NOT FOUND

32.2 Listing of a figure program

By pressing (L) before (PRINT) the programme codes of the figure will be listed. In order to have room for many lines, start pressing first (ROT) 90 (ROT) -possibly you may choose 2 mm SIZE giving room for 87 programme lines. For comparison, 3.5 mm SIZE gives room for 49 only programme lines.

32.2.1 Examples of programming

Example 1: Linear figure

Typing

(MEM) 0 (STO) 01 (STO)
(f) (PRGM)
M X .4 Y .4 (LINE)
S (LINE)
D (LINE)
X .4 Y .4 (LINE)
X .4 Y – .4 (LINE)
X – .8 (LINE)
U
(f) (PRGM)
(STO)

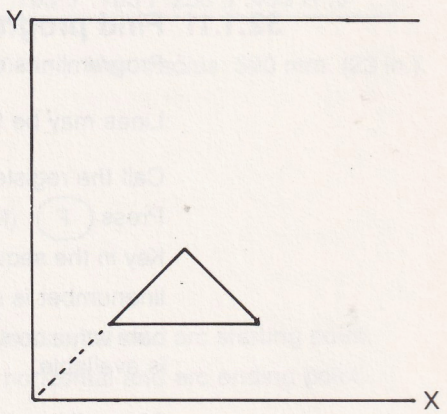
Listing

(RCL) 01 (RCL)
(L) (PRINT)

PG .4 M X .4 Y .4
.8 S
30 D
40 X .4 Y .4
50 X .4 Y – .4
60 X – .8
70 U PG

Drawing

(RCL) 01 (RCL)
(PRINT)
(Movement to X.4Y.4)
The pen stopps by reason of the S command in line 20
(PRINT)
(now the figure is drawn)



32.2.2 Example 2: Circle

Typing

(MEM) 0 (STO) 02 (STO)
(f) (PRGM)
D (LINE)
C X .3 (LINE)
U (f) (PRGM)

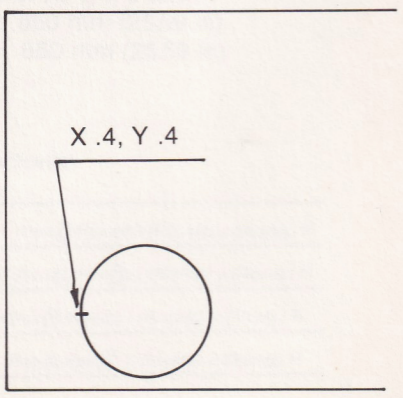
Listing

(RCL) 02 (RCL)

(L) (PRINT)
PG .4 D
.8 C X .3
30 U PG

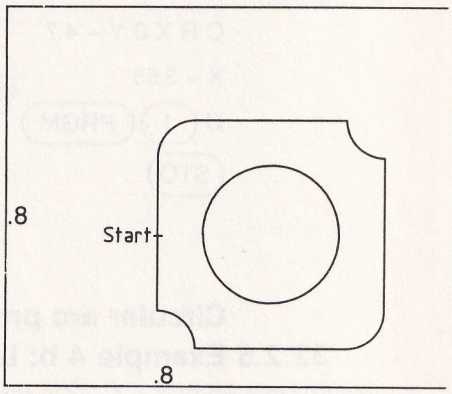
Drawing

(RCL) 02 (RCL)
(PRINT)



32.2.3 Example 3: Combined figure

Typing		Listing	Drawing
(MEM) 0		(ROT) 90 (ROT) (HOME)	
(STO) 03 (STO)		(RCL) 03 (RCL)	(RCL) 03 (RCL)
(f) (PRGM)		(L) (PRINT)	(PRINT)
M X .8 Y .8	(LINE)	PG .4 M X .8 Y .8	
D	(LINE)	20 D	
Y .4	(LINE)	30 Y .4	
C R X .2 Y .2	(LINE)	40 C R X .2 Y .2	
X .8	(LINE)	50 X .8	
C L X .2 Y – .2	(LINE)	60 C L X .2 Y – .2	
Y – .8	(LINE)	70 Y – .8	
C R X – .2 Y – .2	(LINE)	80 C R X – .2 Y – .2	
X – .8	(LINE)	90 X – .8	
C L X – .2 Y .2	(LINE)	100 C L X – .2 Y .2	
Y .4	(LINE)	110 Y .4	
U	(LINE)	120 U	
X .3	(LINE)	130 X .3	
D	(LINE)	140 D	
C X .3	(LINE)	150 C X .3	
U (f) (PRGM)		160 U PG	
(STO)			



Circular arc programme 1
32.2.4 Example 4 a: Letter B (metric)

Typing

STO 04 STO
f PRGM
D
Y 9
X 3.35
C C Y – 2.15
C R X 0 Y – 4.3
X – 3.25
X 3.65
C C Y – 2.35
C R X 0 Y – 4.7
X – 3.65
U f PRGM
STO

Listing

ROT 90 ROT HOME
RCL 4 RCL
L PRINT
PG 10 D
20 Y 9
30 X 3.35
40 C C Y – 2.15
50 C R X 0 Y – 4.3
60 X – 3.25
70 X – 3.65
70 X 3.65
80 C C Y – 2.35
90 C R X 0 Y – 4.7
100 X – 3.65
110 U PG

Drawing

RCL 4
PRINT

Circular arc programme 2
32.2.5 Example 4 b: Letter B

Typing

STO 04 STO
f PRGM
D LINE
Y 9 LINE
X 3.35 LINE
C R X 2.15 Y – 2.15 LINE
C R X – 2.15 Y – 2.15 LINE
X – 3.25 LINE
X 3.65 LINE
C R X 2.35 Y – 2.35 LINE
C R X – 2.35 Y – 2.35 LINE
X – 3.65 LINE
U f PRGM
STO

Listing

ROT 90 ROT HOME
RCL 04 RCL
L
PRINT
PG 10 D
20 Y 9
30 X 3.35
40 C R X 2.15 Y – 2.15
50 C R X – 2.15 Y – 2.15
60 X – 3.25
70 X 3.65
80 C R X 2.35 Y – 2.35
90 C R X – 2.35 Y – 2.35
100 X – 3.65
110 U PG

Drawing

RCL 04 RCL
PRINT

Circular arc programme 1

32.2.5. Shaft with key way

Typing

(STO) 05 (STO)
(f) (PRGM)

PG10 x2.5y14.79
20 d
30 ccx – 2.5 y – 14.79
40 crx–5y0
50 y–5
60 x5
70 y5
80 u
90 x–2.5y–14.79 PG
(f) (PRGM)
(STO)

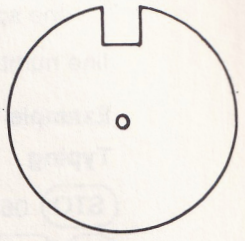
Listing

(ROT) 90 (ROT) (HOME)
(RCL) 05 (RCL)
(L) (PRINT)

PG10 x2.5y14.79
20 d
30 ccx-2.5y-14.79
40 crx-5y0
50 y-5
60 x5
70 y5
80 u
90 x-2.5y-14.79PG

Drawing

(RCL) 05 (RCL)
(PRINT)



o=start / end

32.3 Figures with text

Text in figures may be positioned by the absolute command MX... Y... and entered outside the programme.

Example:

Typing

(STO) 05 (STO)
(f) (PRGM)

M X 8 Y 1.2
(f) (PRGM) EMERGENCY STOP
(STO)

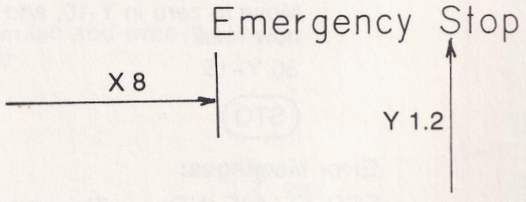
Listing

(RCL) 05 (RCL)
(L) (PRINT)

PG 10 M X 8 Y 1.2 PG EMERGENCY STOP

Drawing/writing

(RCL) 05 (RCL)
(PRINT)



32.4 Corrections (Figure programmes)

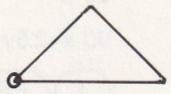
Choose the register and press (E) for Edit.

New line numbers can be defined, for instance 21, 22 and so on, by keeping the following syntax:

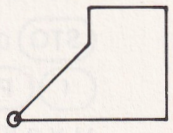
1234 MX15Y45 (LINE)

- 1234: line number (max. 4 figures).
- one space separating number and command
- MX15Y45: drawing command
- (LINE): end with (LINE)

Example 1:

Typing		Listing	Drawing
(STO) 06 (STO)		(RCL) 06 (STO)	(RCL) 06 (STO)
(f) (PRGM)		(L) (PRINT)	(PRINT)
D (pen down)	(LINE)	PG 10 D	
X10Y10	(LINE)	20 X10Y10	
X10 Y–10	(LINE)	30 X10Y–10	
X–20	(LINE)	40 X–20	
U (pen up)	(LINE)	50 U	
(f) (PRGM)		60 PG	○ Pen start, end
(STO)			

Program changes can be made by typing new lines between the present ones.

Typing		Listing	Drawing
(RCL) 06 (RCL)		(RCL) 06 (RCL)	(RCL) 06 (RCL)
(E)		(L) (PRINT)	(PRINT)
Move cursor to the wanted place		PG 10 D	
(g) (INS)		20 X10Y20	
22 Y5	(LINE)	22 Y5	
23 X 10	(LINE)	23 X10	
(g) (INS)		30 Y–15	
		40 X–20	
Correction:		50 U PG	
Move the cursor to the character to be corrected , and select X and delete X10 by pressing	(DEL) 3 times.		○ Pen start, end
Move to zero in Y-10, and enter now read	(5)		
30 Y–15			
(STO)			

Error Messages:

ERROR LINE (NO)	The programme checks the syntax and indicates, in which line the errors are made. Change into edit-mode, and correct the error by using the cursor.
RANGE ERROR (NO)	The programme controls, if the figure is outside the drawing field, and indicates the line in question. As the programme is incremental, the actual cause of error might be in a previous line being too long.

Error messages are deleted by pressing any key.

32.5 Reference to other cassettes

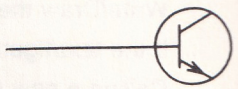
Figures from figurecassettes may be used in user programs, by calling the figurecassette and selecting the figure to be placed in a specified position by the user program.

Call the figure: (FIG) (connector number) ( ) (= space) (figure number) (FIG)

in the display is shown: FG2 123FG

More figures are called using a comma as separator

ex: (FIG) (con.no.) (SPACE) (fig a), (fig b), (fig c) (FIG)



in the display is shown: (ex) FG 2 123,124,125 FG

Example:

Listing:	**Comments:**
PG 10 MX10Y13	Starting point X10, Y13
20 S	Stop to position the scriber
30 D	Lower the pen
40 X20	Line X20 mm
50 U	Pen up
60 X7PGFG2 30 FG	Move X7 mm, figure-cassette in conn. 2 Figure 30 is drawn

The figures may be scaled individually.

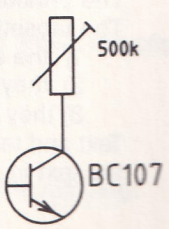
Example: FG2 SI250SI123,SI200SI124,SI50SI125,126FG

the following figures will be scaled to 50% also.

32.6 Combination of user program, figure-cassette and text

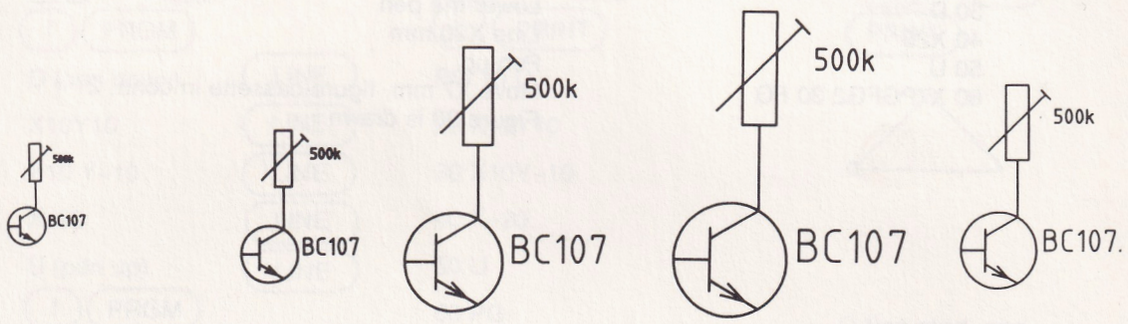
The following example explains the combination:

Listing:	**Comments:**
PG10 MX10Y15	Move to X10, Y15
20 S	STOP and position the scriber.
30 X7PGFG2 30FGPG10 Y6.5	Move the pen 7 mm, draw from cassette 2 figure no. 30, and move the pen 6,5 mm up.
20 D	Lower the pen
30 Y7.5PGFG2 32FGPG10 U	Draw a vertical line 7,5 mm. Select from cassette 2 figure no. 32. (Pen up is not necessary)
20 X5Y5PGSI2.5SI500k	Move the pen up right. Change SIZE to 2,5 mm, and write: 500k
PG10 X-8Y-17PGSI3SIBC107	Move the pen down left and write in 3 mm SIZE: BC107



32.7 Scaling of a user-programmed text/figure

Call the register, press (S) and
the display shows: REG-NO. xx yyy %
where xx is the register number, and yyy is the latest entered scale between 10 and 500%.
A new scale may be entered
Write/Draw the register by (PRINT)
If the text/figure should be repeated, press (PRINT) again
Calling a new register, automatically resets the scale to 100%
Pressing (S) assumes the previous value of YYY %, and if OK, continue to draw pressing (PRINT).



32.8 Programmed tabulatorstops

Tabulatorstops can be programmed in memory indicating a number of mm/inch from HOME

Enter:	**Comments:**	
(STO) (registernumber) (STO)		
(f) (PRGM)		
(TAB) 10 (LINE)	Stop at 10 mm	(.4 in)
(TAB) 25 (LINE)	Stop at 25 mm	(1 in)
(TAB) 60 (LINE)	Stop at 60 mm	(2.4 in)
a.s.o.		
(TAB) 223	Stop at 223 mm	(8.8 in)
(f) (PRGM) (STO)		

30 stops can be programmed (Line 10 to 300).
The program cancels all previous TAB-settings.
The tabsetting programme is active after keying (RCL) (registernumber) (PRINT)
The printlamp is lit for 0,4 seconds during activation.
The tabsettings are valid until
1) the scriber is switched off
2) they are manually set
3) they are replaced by another programm setting tabsettings.

Text and tabulatorstops can be mixed, but it is advisable to store the stops in one register, and the text in another register.

33. Copying COPY

COPY allows copying of texts or figures to create new figures or texts, by modifying in a copy.

The copy function is activated by pressing (f) (COPY) or (g) (COPY)

The copy function can also be called when in memory

The display shows: COPY

The scriber is ready to receive copy commands.

All commands shall obey the syntax:

COPY TO = COPY FROM

The copying is activated by pressing (PRINT)

When the copying is complete, the display shows: COPY COMPLETE
for 0.4 sec., then it shows: COPY
and new copy commands can be entered.

Cancel the copy function by pressing (f) (COPY)

33.1 Copying of registers in a memory/memory-cassette

Example: (COPY) m2r34=m2r22

Copying to memory-cassette in connector 2 register 34, from the same cassette's register 22.

If the cassette has been called previously, the designation m2 can be omitted on both sides of the equal sign, so:

(COPY) COPYr34=r22

Registernumbers are two-digit 00 to 99

33.2 Copying of registers to another memory/memory-cassette

Example: COPY m1r35 = m0r99

Copying to memory-cassette in connector 1, to register 35, from internal memory 0 (Zero) register 99.

33.3 Copying a complete memory/memory-cassette

Example: COPY m1ra = m0ra

Copying to memory-cassette in connector 1, all registers from internal memory 0 (Zero), all registers.

Pressing (PRINT)

the display shows: COPY ALL? Y/N

allowing the user to regret.

Continue the copying by press (Y) (yes)

During the copying the display shows: WAIT COPY

Note: The registers are copied one by one. If the receiving cassette is too small, the copying can only continue until the cassette is filled.

The display shows: MEMORY FULL

The contents of the sending memory are undisturbed by interruptions of the copying.

34. Interface COPY

By means of the interface-cassette a PC, printer or computer (external unit) can be attached to the scriber.
Using interface-cassettes makes possible:

— Copying texts to or from an external unit (Personal Computer)
— Remote facility.

Operating the interface external units, LINEX data-technic can supply the software for copying texts to/from PC's using CP/M 86 and MS-DOS/PC-DOS operative systems.

34.1 Copying text to/from external unit

Using the copy function and interface-cassette copying to/from an external unit can be performed so:

press (COPY) the display shows COPY

Now there are 2 ways of copying:

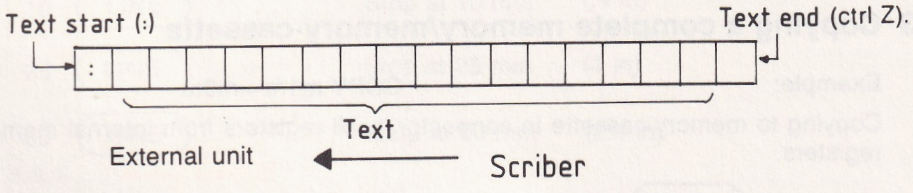
1) Copying from the scriber to an external unit
2) Copying to the scriber from an external unit

Copying from the scriber to an external unit

If the interface-cassette is placed in connector no. 1 the following syntax will do the copying:

press i1 = mOr11

The contents of the internal memory's register 11 are transmitted from the scriber as shown. (All transmission in ASCII-codes):



The transmission being with a text-start indicator (:), the text follows, and finally a text-end indicator is sent (ctrl Z).

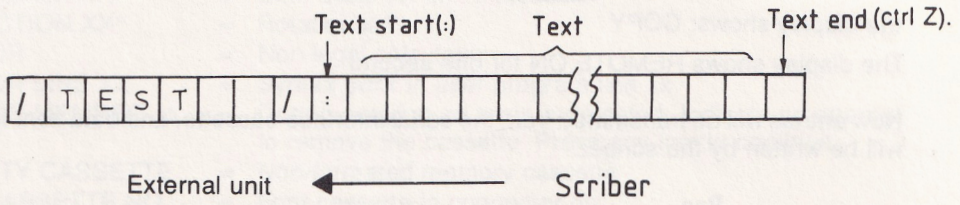
34.1 Copying text to/from external unit (continued)

Another possibillity for copying is transmitting a name before the text.
This facility allows the storing on the external unit's background storage, or allowing an external unit to choose between different ways of data processing.

Assuming the same connector in use as previous examples, this kind of copying performes:

COPY (PRINT) i1,test = m0r11

The contents of the internal memory's register 11 are sent as shown:

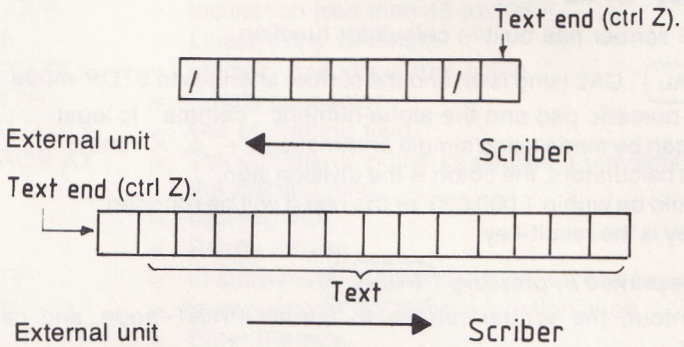


First the file name »TEST« between two slashes is sent. Then follows the text start indicator (:) and the text. The transmission ends with a ctrl Z character.

Copying from external units to the scriber

Keying m0r11 = i1,LINEX (PRINT)

starts a transmission from the scriber, where the filename »LINEX« between two slashes is transmitted.
The external unit now reads data stored on the diskette under the name »LINEX«, and thereafter the transmission of the text continues to the scribers internal memory's register 11.



The command can be used without the filename.

Copying to/from external units can be interrupted by pressing the STOP-key.
The display shows: COPY ABORTED

34.2 Remote

The remote function allows data processing of entries from the scriber keyboard before it is written by the scriber.

Remote requires a serial interface-cassette.

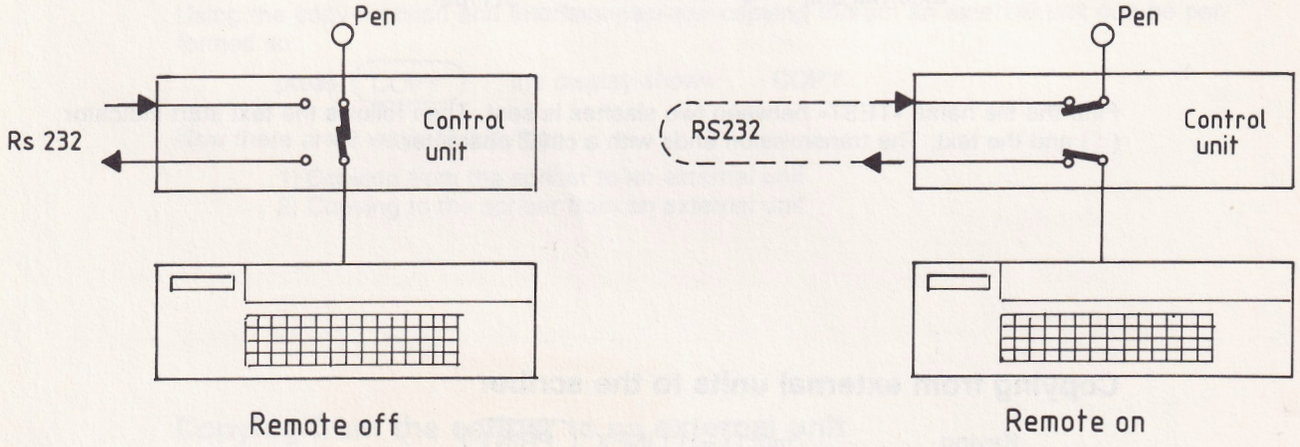
Activate Remote by the COPY-function.
If the serial interface-cassette is placed in connector no. 1 enter:

(COPY)
i1 = REM (PRINT)

the display shows: COPY

The display shows REMOTE ON for one second

Now entries will be transmitted from the serial interface-cassette, and data sent to the cassette will be written by the scriber.



Cancel remote mode by sending the ctrl Z-character from the external unit to the scriber, or by re-initializing the scriber, see 3.4.
If the first choice is used, the display shows »REMOTE OFF« until activating any key.

35. Calculator CAL

The lines 803 scriber has built-in calculator function.

Pressing (CAL), CAL lamp is lit, and the scriber changes to STOP-mode.
Now only the numeric pad and the alpha-numeric "comma" is legal.
Calculations can be made using simple arithmetic as +, −, ×, and :
Unlike pocket calculators, the colon is the division sign.
Numbers should be within 1.000.000, or the result will be rounded.
The equals-key is the result-key.

Results can be printed by pressing (PRINT)
After the printout, the scriber returns to normal PRINT-mode, and cancels the calculator automatically.
Calculator results can be stored in the register, but not in the cassettes, as the Memory-cassette call-up-procedure deletes the display content.
Use the register as the calculator memory.

Clear the calculator by pressing (STOP).

36. Display messages

BATT. LEVEL LOW	=	The battery needs replacement (internal memory). See a LINEX serviceman
CIRCLE	=	Circle function
COPY ABORTED	=	Copying aborted by the STOP-key
COPY ALL? Y/N	=	If a whole memory must be copied press Y - when not press N
COPY COMPLETE	=	Copying completed
DELETE ALL Y/N	=	Tabulators to be deleted Yes/No
DELETE REG Y/N	=	Is chosen register to be deleted Yes/No
DIM SCALE X:Y	=	Dim. scale for dim indication
DIRECTION XX°	=	Rotation xx°
ERROR	=	Non-legal calculation
ERROR LINE XX	=	Syntax error in user program line xx
ERROR MEMREG xx	=	During copying an error is detected. Indicate an attempt to remove the cassette. Press any key to continue.
FAULTY CASSETTE	=	Non-formated memory cassette
FIG CASSETTE NO	=	Font cassette in connecter no.
FIG SIZE	=	Fig. size can be chosen
FIND	=	Find text/numbers
FONT NO	=	Fontcassette in connector no.
FORMAT MEM? Y/N	=	Format memory yes/no
GRID OFF	=	Grid mode off
GRID ON	=	Grid mode on
HIDDEN CIRCLE	=	Hidden circle
ILLEGAL CASSETT	=	Wrong type of cassette
ILLEGAL COMMAND	=	Illegal copy-command
ILLEGAL DIAMETER	=	Diameter less than 1 or bigger than 50 mm (0.039-1.969 in)
ILLEGAL DIM	=	Arrow points outside 250 mm or insufficient space between arrowheads for the numerals (plus text)
ILL DIM DIRECTION	=	Rotations other than 0° and 90°
ILLEGAL DIRECTION	=	Wrong degree for Rotation
ILLEGAL FIG NO	=	The number is not in the cassette
ILLEGAL FRACTION	=	Syntax errors in the fraction
ILLEGAL LINE SPACE	=	Line space less than 1.4 or bigger than 42 mm (.055 to 1.653 in)
ILLEGAL SCALE	=	1) Scaling % less than 10 or bigger than 500 % 2) Scale of dimensions above 1:100 or less than 100:1
ILLEGAL SIZE	=	SIZE below 1 or above 30 mm (0.039 to 1.969 in)
ILLEGAL SLOPE	=	Inclination less than 45 to 135 °
LINE SPACE	=	Linespacing xx mm/in
MEMORY XXXXX	=	Memory has xxxxx free bytes
NO CASSETTE	=	Empty connector
OUT OF FIELD	=	Out of drafting field
RANGE ERROR XX	=	The command in line xx causes a movement out of the drafting field
RCL NO	=	Call reg. no.
READY	=	Ready for use
REMOTE OFF	=	In copy-mode the remote-function has been switched off
REMOTE ON	=	In copy-mode the remote-function is on
SIZE	=	Enter the size
SLOPE	=	Enter the slope
STO NO (XX)	=	Next free register is no xx
SYMBOLS NO	=	Symbolcassette in connector no.
SYNTAX ERROR	=	Syntax error in a Copy-command
TAB TABEL FULL	=	All 30 tabulators set
TAB POS X = 123.4	=	Tabulator position 123.4 mm
TEXT NOT FOUND	=	Wrong searchword
USER MEM FULL	=	Memory (cassette) full
USER MEM NO	=	Memory selected, type connector no.
WAIT	=	Wait
WAIT COPY	=	Copying active
WRITE PROTECT ON	=	Write protect on
X = 200.0 Y = 22.0	=	Penposition X 200 Y 22 mm in VECTOR

37. Maintenance

To ensure a continuous duty of the scriber it is important that the user keeps the scriber from smudge and especially dust when erasing drawings. Always handle the mechanical writing unit carefully especially when changing pens.

37.1 Cleaning

Clean the scriber from graphite dust on the lower side, and clean the keys and keyboard from finger perspiration.
Best cleaning agents are mild soap and water. Use a lightly dampened cloth to wipe off the dust and dirt. Be careful not to spill water on the keyboard.

USE NO SPIRIT/ALCOHOL, CLEANING SOLVENTS/BENZINE or SOLVENTS.

Ink spots should be removed immediately with a moistened cloth.
Etching ink has to be removed with pen cleaning fluid, but take care.

Dust and dirt from erasers contain lead-graphite, which is a conductive material. Always remove the scriber when erasing, or at least elevate the drafting head to the uppermost position, until all dust has been brushed off.
If by accident foreign matter has entered the scriber house, remove as follows:

1) Detach the scriber from the drafting machine.
2) Remove the ruler from the scriber.
3) Shake the scriber in a way that the foreign matter drops to the handle in the right end.
4) Turn the scriber, the penarm-slot turning downwards, and shake out the matter.

The electronic circuits in the scriber are not insulated completely.
Conductive foreign matters have to be removed by an authorized repairman, if you are unable to remove the matter by the above method.

Foreign matter dropped into the control unit should be shaken towards one of the ends, where there is ample room to deposit it out of range from delicate electronic parts.

37.2 Trouble shooting

Neglecting maintenance may cause troubles in the scriber such as none or weak pen-up movement.
The cause can be a defective spring in the penarm ruined during inserting pens, or the penarm is off-set due to rough handling.
Control the function so:

1) Select VECTOR and PRINT-mode and press the 5-key.
2) Turn the scriber upside down and try to force the pen down. The penarm should feel spring balanced, otherwise the spring should be replaced by a serviceman. Friction in the movement indicates an off-set penarm.
   Adjustment can be made by carefully loosing the 3 central screws holding the penarm on the spring and positioning the penarm centered. Tighten the screws carefully.

Poor lettering

Poor lettering is caused by a weak penarm spring or a loose cross-slide due to dirt in the guide-rollers.
This kind of error requires service by a serviceman.

Stop during writing

Stop during writing may be caused by foreign matter in the mechanical unit.
Call a serviceman.

37.2 Trouble shooting (continued)

Unstable HOME-position

This trouble is caused by miscount in the movement registers. Draw a 50 mm circle and a 250 mm dimension line. The error is visible as flats on the circle or missing parts or the arrows. The cause can be dirty encodes on X or Y motors or the need for an electronic adjustment. Call a serviceman.

Uncontrolled or missing penmovement

This trouble indicates a broken wire in the scriber cable or a poorly inserted scriber cable connector.
The former trouble needs calling a serviceman.

38. Service

38.1 Warranty

LINEX scribers are manufactured with the utmost care and considering a satisfactory function for many years.
Defective materials will be repaired free of charge in the warranty period.
Losses caused by means of unavailability of the scriber during repair are not covered by LINEX data-technic a/s.

38.2 Repair

For each scriber sold, an instruction for local/national repair organization will be given.
Names of authorized service companies can be obtained from

A.D.S./LINEX,INC.
3130 GATEWAY DR.
SUITE 400
NORCROSS,GA.30071
800/241-3675
404/448-0977

39. Technical specifications

Drafting area:	x 250 mm, y 50 mm.
Pen:	Technical pen with standard thread.
Drawing increment:	.01 mm.
Pen down speed:	8 to 40 mm/sec. selectable in five steps.
Pen up speed:	75 mm/sec.
Writing speed:	2 characters per second at 3,5 mm lettering height.
Fonts:	ISO 3098 B, DIN 17, Universal ANSI Y 14.2.
Lettering height:	1.00 mm-30.00 mm, adjustable by .01 mm increments: (or .04''-1.18'', adjustable by .001'' increments).
Lettering width:	Adjustable 10-200 %
Figure size:	Variable by 1% increments from 10% to 500% (1:10 to 5:1): max. 250×50 mm.
Memory:	10 files of 32 characters each incorporated: in internal memory 14.000 characters. 803A internal memory 28.000 characters.
Calculator:	Built-in pocket calculator with 6 significant digits. Numerical range: 13 digits; 4 basic mathematical operations. 10 storage register.
Display:	Liquid crystal display, 5×7 dot matrix with cursor. Up to 16 characters displayed at a time.
Units of measurement:	mm or inch. Used when keying in lettering height, circle diameters, and dimensions.
Programme cassettes:	FIGURE-cassettes. Figures are selected by means of a number. FONT-cassettes. Other fonts or alphabets. Foreign alphabets on a header and in display. SYMBOL-cassettes. Symbols are encoded into the keyboard and recalled by a single depression of a key. MEMORY-cassettes. User memory with 3.500 or 14.760 characters per cassette. SPECIAL-cassettes. Supplied to order. INTERFACE-cassettes. For communication to external units.
Accesories:	Tape unit. Stores 4 times 32000 characters per tape.
Line drawing:	4 line types: solid line, dashed line, dot-and-dash line, dash-double-dot line. Can be drawn in 4 directions.
Circle:	Circle diameter from 1.00 mm to 50.00 mm (.04'' to 1.96''), drawn solid or dashed (dashes automatically adjusted to suit the lettering height and diameter of circle).
Vector control:	With the VECT-key and the numerical keys the pen can be joystick-controlled in 8 directions, both lifted and lowered
Movement of pen during texting:	The pen can be moved in 4 directions: forwards and backwards with SPACE and BSP, up and down with with UP og DN.
Tabulator:	Up to ten tabulator stops can be entered for writing of columns.
Drafting area limit:	The pen lifts automatically if an attemps os made to draw outside the drafting area.
Accents:	Accents are not tied to specific letters. i.e. they can be drawn over any letter or character. Accents are automatically centered andat the correct height.
Auto repeat:	13 keys (arrows, surface roughness symbols, and lines) are provided with an auto-repeat function, i.e. the character is continued as a straight line as long as the key is kept depressed.
Ruler:	LINEX ruler with bevel tracing edge. 300 mm division for hand drawing, 250 mm indication for pen movement. Available in most common scales.
Attachment of scriber:	By means of the ruler chuck on most leading drafting machines.
Power supply:	110 or 220 V± 10%, approx. 55 VA.
Dimensions and weights:	Scriber: 484×166×33 mm including ruler, approx. 1,2 kg. Control unit: 560×150×390 mm, approx. 11 kg.
Development & production	LINEX data-technic a/s Gunnekær 24, DK-2610 Rødovre, Denmark. Telephone: (451) 70 19 45 — Telex: 27533 linex dk.